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THE WILSON ORNITHOLOGICAL CLUB

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INCUBATING SANDHILL CRANE
Crouching in Concealing Posture. *From a painting by George Miksch Sutton.*

THE WILSON BULLETIN

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NESTING OF THE SANDHILL CRANE IN FLORIDA

BY ERNEST G. HOLT

The conclusion of a short field assignment with the Cleveland Museum of Natural History found my wife and me, at the end of February, 1924, in the famous Kissimmee Prairie region of peninsular Florida. We were stopping in the home of a hospitable cattle man of a passing regime—a house that had offered shelter to wandering ornithologists before this—and, as the infrequent mails were bringing news of increasingly severe weather in the north, we became more and more reluctant to leave the brilliant skies, luscious oranges, and teeming bird-life that were ours without greater effort than a stroll through our host's hammock. However, the clinching argument that determined we should stay was furnished by the indescribable rolling, gurgling calls of a flock of Sandhill Cranes (*Grus mexicana* (Muller)) that passed every day over the hammock in their flights to and from their feeding grounds in the river marsh.

Others have studied the Sandhill Crane along the Kissimmee and I have knowledge of a number of sets of eggs that have been taken there in the past, but examination of the literature at my disposal fails to disclose any very adequate account of the nesting of the species. Therefore, in spite of the fact that we were not equipped with proper photographic apparatus for the kind of work most needed, and that other circumstances brought about our departure right at the height of the nesting season, it is deemed wise to record in detail our observations on this vanishing species. Whatever contribution these notes may furnish is presented as an independent study, with no attempt at an exhaustive review of the literature.

The Country

Facing a broad marsh that extends for miles up and down the opposite side of the river, Sid Pearce's house stands amidst a magnificent assemblage of moss-bearded live oaks and stately cabbage palms in a hammock on the right bank of the Kissimmee River (Figures 2 and 3). A better place for bird-study than this riparian hammock could hardly be imagined. Without getting out of sight of the house

we recorded almost every species to be found in the whole countryside. On our first short stroll along the sandy road between the river and the jungle we saw, in or near the water, Pied-billed Grebes, Water-Turkeys, Lesser Scaup Ducks, Ward's, Louisiana, and Little Blue Herons, Wilson's Snipes, Killdeers, Kingfishers, Phœbes, Fish Crows, Red-wings, Boat-tailed Grackles, and Tree Swallows; in the hammock were Red-shouldered Hawks, Sparrow Hawks, Red-bellied Woodpeckers, Flickers, Blue Jays, Shrikes, Cardinals, Mockingbirds, and Thrashers. Myrtle and Palm Warblers were everywhere, and from the dense undergrowth of saw-palmettos issued unceasingly a subdued rustle—the scratching of scores of pairs of little Towhee feet among the fallen leaves. Later, Caracaras were seen in this same hammock; and a Pileated Woodpecker came more than once to the trees in the very yard. Such was our base.

Two miles north-northeast, on the edge of an extensive pine "island", is the little hamlet of Bassenger, its few scattered houses almost lost in a thicket of guava bushes. Between, stretches the road from Sebring, carried over the river and marsh on a series of bridges. Traffic on this road, still unimproved at the time of our visit, was not heavy, and from the bridges could be seen in the surrounding marsh a numerous and contented population of Florida Ducks, White Ibises, herons, Coots, and other water-loving species. Here too dwelt the Limpkins, which, as if sensing the approach of civilization and their impending doom, made night disconsolate with their loud lamentations. Back from the road, along the shallow edges of the marsh, a flock of a dozen Sandhill Cranes daily sought their food.

The pine "island" beginning at Bassenger extends in irregular outline for several miles to the north, east, and southeast. The timber is neither very thick nor of large size, and the dominant undergrowth is saw-palmetto. At intervals there are small hammocks of hardwood, or, more frequently, open spaces of several acres occupied by shallow ponds. On the northern edge of the "island" a pair of Bald Eagles had their aerie about fifty feet up in a tall pine. Beyond, the horizon is broken only by a few cabbage palms, and by a quadrangle of eucalyptus trees which stand as a forlorn, incongruous monument marking the burial place of the hopes and fortunes of many a poor farmer from the North. Once a hotel stood among these trees and a railway had its terminus not far distant. An orange tree more than fifteen years old had been transplanted, fruit and all, from Bassenger—and had lost a dozen years in transit. Maine potatoes were dug by the peck from beneath carefully nurtured little plants, right before the

FIGURE 2. A meander of the Kissimmee River near Bassenger. Moss-draped live oaks line the banks.

FIGURE 3. The edge of the Kissimmee Marsh. One of the cabbage palms at the right harbored a nest of Audubon's Caracara.

astonished eyes of those who had come to buy the worthless prairie. But truth will prevail. The ties of the railway became fence posts on a neighboring cattle ranch which, in its turn, has become bankrupt. Despite numerous attempts at colonization this section remains perhaps the wildest of any in the State, except the Everglades, and one may ride for fifteen or twenty miles in some directions without encountering a human habitation. Soon, however, another railroad will rattle its way over the prairies and this time it will be a branch of one of the big systems. Even while we tarried, its engineers were surveying a bridge site below Pearce's.[1]

Another pine-land ("Big Pine Island"), essentially like that at Bassenger, lies four or five miles west of Pearce's Hammock. Except for these and the oak hammocks along the river the country is a vast level expanse of prairie covered with stunted saw-palmetto and sparse grasses and shrubs, and dotted here and there with cabbage palms and occasional "heads" of bay, gum, or cypress. The soil throughout the prairies is sandy and infertile, appreciated only by gopher tortoises and Burrowing Owls.

Ponds are everywhere, throughout prairie and pine-land alike, and of sizes varying from the merest puddle to lakes acres upon acres in extent. All are shallow, in varying degrees, and their water content is dependent upon rain. During our stay the season was wet and the ponds exceptionally full. The greater area of most ponds is grown up with a peculiar shrub (*Hypericum fasciculatum*) which, because of its resemblance to one of the stunted conifers, is called "guinea cypress", while the centers of the deeper ponds support a rank growth of pickerel weed (*Pontederia cordata*). These two plants furnish the principal nesting material of the Sandhill Cranes. The deepest ponds often surround a central core of bay, gum, or cypress, called in the parlance of the country a "head". It is seldom possible to ride a horse to these trees. About the margins of the ponds is a border of broom-sedge or wiry grasses or sedges that is overflowed only when the ponds are very full. It is about these ponds and their immediate environs that the life of the Sandhill Crane centers.

The Bird

Even in its natural haunts the Sandhill Crane is a most conspicuous bird. Of huge size, it could scarcely be overlooked although standing motionless on the prairies; certainly not while flying with neck and legs stretched to their utmost, the great wings beating regu-

[1]The manuscript of this article was completed in September, 1924. The railway has since become an accomplished fact.

FIGURE 4. Nest No. 3. General view showing comparative size of the nest.

FIGURE 5. Nest No. 3. (Egg set No. 212). Detail of the nest and eggs.

larly but with quick upward jerks as if actuated by springs. And were this not enough, when it takes the air the bird gives utterance to its peculiar call that is sure to demand instant attention of anyone within range of its vibrations. Fortunately the bird realizes its conspicuousness and, except when sitting on the nest, seeks safety in flight rather than in concealment. Its extreme wariness was well impressed upon me during the many days spent in the attempt to take a couple of specimens for the museum.

The conspicuousness of the birds is apt to give a false impression of their abundance. Though easily seen, their numbers are few. An indication of actual abundance may be obtained from the following four censuses: (1) February 11, five groups of 2, 3, 3, 2, and 2, respectively, were seen on a nine-mile ride across the prairie and pine-land southwest of Pearce's; (2) February 29, on a fourteen-mile traverse to the southwest, 3, 2, 1, 2, and 2 were seen; (3) March 21, an all-day ride northeast and north of Bassenger netted 2, 2, 1, 2, 1, and 3; and (4) on March 23, a whole day's ride, again southwest of Pearce's, produced 2, 2, 2, 2, 1, 2, 2, 3, and 2 cranes. The greatest number seen in any one flock was the dozen apparently unmated birds that ranged together in the river marsh opposite Pearce's.

With the exception of this last flock all the cranes observed were found about the shallow ponds on the prairie and the edges of the pine "islands". While not necessarily in the water, no bird was ever found, even while feeding, at any great distance from it. In almost every pond a lone Ward's Heron stood guard—a solitary sentinel in neutral blue-grey—and the eye eagerly scanning his retreat for a crane often mistook him for the bird sought. However, the reverse was never true. No crane was ever passed by for a heron. In the field the crane is distinctly browner and less blue than the heron and its body is much fuller and heavier and is held more horizontally. The crane was never observed to assume the post-like posture so often affected by the heron.

Truly the Sandhill Crane is a remarkable bird, from every point of view, and no written description can do it justice. It is but another example of the truism that an animal can not be rightly understood apart from its environment. A Sandhill Crane may be seen mounted, in almost any museum, but to appreciate the living bird, pulsating with life and regal in its freedom, one must also visualize the wide-reaching prairies with a fretwork of pines against the horizon, the ponds reflecting the clear blue of the limitless vault in which floats no cloud;

FIGURE 6. A Prairie Pond. One of the myriad dotted thickly over the whole countryside.

FIGURE 7. Nest No. 4. (Egg set No. 215). The only nest found on dry ground.

above all he must himself thrill to the resonance of its wonderful voice—the essence, the very spirit of the wild free open spaces where it makes its home.

The Nests

On our long rides over prairies and pine-land we were fortunate enough to find, in all, ten nests of the Sandhill Crane. Inasmuch as the published accounts of the nesting habits of the species are rather general in their terms, we are presenting the observations we were able to make, in the same detail in which they appear in our field notebooks.

Nest No. 1. On February 28, we rode eight miles to see a nest that had been reported to us. It was a small platform of herbaceous plant stems, built up barely above the water level in the shallow margin of a prairie pond—but evidently our informant had taken the precaution to remove the eggs. No birds were seen.

Nest No. 2. February 29. A nest in process of construction was found in the deep water at the center of a pond among the pines. It was merely a flat platform of pickerel weed stalks, built among living plants of the same species. March 14, two cranes were seen near this nest, but no further work had been done on it. Probably the frequent passing of a motor truck, hauling materials for the construction of a dipping vat on this "island", caused the abandonment of the nest.

Nest No. 3. March 14. While riding across the prairie we flushed from an old burn a single Sandhill Crane which flew to a near-by pond. We followed, of course, whereupon two Sandhill Cranes left the pond and disappeared across the prairie. A short search was sufficient to reveal the conspicuous nest, a nearly flat platform of sticks and woody stems of "guinea cypress", exposed in a sparse growth of broom-sedge and "guinea cypress" near the edge of the pond (Figures 4 and 5). The structure was about two and one-half feet in diameter and was built up from the bottom, in water six or seven inches deep, until the rim was three or four inches above the surface. The two eggs, though not pipped, contained embryos that were cheeping distinctly within the shells, but fearing that others might not be found we collected them anyway. The nest was examined again on March 23, but there was no indication that the parents had made any further use of it.

The eggs (Set No. 212) measure 93.5x60.5 and 94x61 mm. The ground color of one is very pale olive-buff, of the other, almost olive-buff. Both are marked with roundish spots, rather than blotches, of cinnamon brown and with obscure spots of pale purplish tints,

FIGURE 8. Nest No. 5. General view of the grassy swale.

FIGURE 9. Nest No. 5. (Egg set No. 217). Detail of the nest and egg. Note the water-soaked spot at the right of the egg.

thickest about the larger ends. The darker egg has a wreath of spots about the larger end.

Nest No. 4. March 21. The flushing of the parent led to the discovery of this nest in a location we would otherwise never have searched—among the saw-palmettos and laden gall-berry bushes of the open prairie. The frail structure, composed of dried grasses and palmetto leaves, a couple of oak twigs and some green "guinea cypress", was about two and one-half feet in diameter and was placed flat on the dry ground (Figure 7). Though situated between two ponds it was about 100 yards from the nearest water. The nest was evidently very new (as some of the grass beneath it was still green) and contained two fresh eggs.

These (Set No. 215) measure 89x60.5 and 93.5x59 mm. One is long-ovate, olive-buff with greenish cast, and blotched all over, but more thickly at the larger end, with tones of lavender and brown. The other is ovate, ground color nearest to deep olive-buff, marked all over with long blotches of wood brown and darker shades of brown and with a thick patch of blotches on the larger end (Figure 14, bottom set).

Nest No. 5. March 22. A nest about two feet in diameter, constructed of dried grasses and superimposed on a low mat of living marsh grass raked together in water about five inches deep, was discovered in a grassy swale between two large ponds on the prairie (Figure 8). The highest part of the nest rim was not over three inches above the water, and the center of the nest, in which the single egg lay, was saturated. This wet spot is evident in the accompanying photograph (Figure 9). Though the situation was entirely exposed the parent sat close until we had approached within about fifty feet.

The egg (Set No. 217), which contained a net of blood vessels, measures 99.5x61 mm. It is long oval-elliptic, the ground color olive-buff with greenish cast, and is marked with generally distributed blotches of buffy-brown and lavender tints (Figure 15, lower-right egg).

Nest No. 6. March 23. A brilliant morning had found us in the saddle as soon as breakfast was over, but success had not been measured by the miles behind us when at noon we rode into the edge of a pine "island". Here a chain of ponds stretched away among the trees, forming open spaces like little land-locked bays. It was but logical to "ride out" these ponds, and we had not gone far when, in the distance, a lone Sandhill Crane was seen stalking sedately through the shallow water. Suddenly, as if by magic, another appeared beside

FIGURE 10. Nest No. 6. The pond in the edge of the pines. Note the dark patch of pickerel weed in the center.

FIGURE 11. Nest No. 6. (Egg set No. 218). Detail of the nest and eggs, showing comparative size.

it, and then the two sprang into the air and with ponderous wing-strokes passed out of sight among the pines, leaving, as Coues has so aptly said, an impression of "momentum from mere weight—of force of motion without swiftness". I sat enthralled. The crystal-clear atmosphere, the brilliant sunshine flooding from a cloudless sky; the rich contrasting tones of pine boles and leaves, of sere grasses and luxuriant pickerel weed; the soothing fragrance of resin warmed by a noontide sun: and the wild reverberant calls of the cranes echoing back through the pines combined to produce in my inner consciousness that peculiar feeling of well-being which comes only with perfect adjustment to the environment. But I was soon aroused by Mrs. Holt's delighted cry and pointing arm, and rode quickly forward to behold the object of our search.

There in the shallow margin of the pond where the water was only about five inches deep, the cranes had built their nest in a sparse growth of "guinea cypress" that afforded not the slightest concealment. This nest was a rather frail structure of "guinea cypress" shrubs that had been pulled up by the roots from the immediate environs, some so recently that they still bore green leaves, and was lined thinly with dried broom-sedge. The almost flat platform was about three feet in diameter, its surface but little more than two inches above the water level, and on it lay two fresh, very dissimilar eggs (Figures 10 and 11). The center of the pond, some distance away, was filled with a rank growth of pickerel weed, the "flag" of the natives.

The eggs (Set No. 218) measure 86.5x59 and 89x61 mm. Both are truncate-ovate. The first, which is the darkest of the entire collection, is deep olive-buff marked, principally about the larger end, with splotches of shades of brown from wood brown to almost black (in a few spots of especially dense pigment). The other, the lightest in the collection, is greenish white, marked, also principally about the larger end, with minute dots and small spots of lavender and buff-brown tones (Figure 14, middle set, and Figure 15, top set of eggs).

Nest No. 7. March 23. After leaving Nest No. 6 we had heard cranes calling in the direction of another pond in the pines, but we had ridden on to some cattle pens to feed our horses and eat our own lunch. Later, when we came back to this pond, everything was quiet. A couple of Ward's Herons arose without haste and flapped silently away; no other bird was in sight. Then my searching eye descried a crane standing in the pond on the farther side, but even as I tried to point it out, it disappeared—vanished utterly—though I was absolutely certain no bird had left the pond. Perhaps it had crouched;

FIGURE 12. Nest No. 7. (Egg set No. 219). Constructed of pickerel weed in the deepest part of a pond among the pines.

FIGURE 13. Nest No. 10. (Egg set No. 220). This nest was the largest and the highest above water of all examined.

but it seemed more likely that my eyes had seen a crane because that was what I most wanted to see, had for the instant constructed one of a tuft of "guinea cypress". Nevertheless we sent our animals splashing across the pond, though the nearer we approached the other side the more it seemed that my eyes had deceived me. Then, when just on the edge of a patch of pickerel weed, which almost invariably marks the deepest basins in the larger ponds, we plainly saw not a phantom, but a crane, crouched as low on its nest as its huge bulk would permit, its neck lying flat so that its red crown was visible only at short range (Frontispiece). It retained this position while I dismounted and waded slowly forward; then it arose, its feet still on the nest, and, springing into the air, flapped majestically off without uttering a sound. A few minutes later, accompanied by its mate, it returned and flew calling about the pond.

The nest was a mass of dead pickerel weed stalks raked up to form an island in water more than a foot deep, and was surrounded by a living growth of the same plant (Figure 12). Its top was a platform of uneven surface only a couple of inches above the water; plainly not high enough, for the under surfaces of the two eggs, and the nest beneath them were wet, and the pores of the eggs were stopped with what appeared to be mildew. In spite of this, however, the eggs contained small embryos that seemed to be alive.

The eggs (Set No. 219) measure 97x60.5 and 101.5x63.5 mm. Both are long-elliptic, and in color between olive-buff and pale olive-buff, marked with small irregular spots of tones of lavender and brown scattered over the whole surface, but more thickly about the larger ends (Figure 14, top set of eggs).

Nest No. 8. March 23. An uncompleted nest of dead pickerel weed was found among live plants of the same kind in the deeper part of a shallow pond on the prairie.. A pair of cranes were seen near at hand.

Nest No. 9. March 24. A new but still empty nest of "guinea cypress" and broom-sedge was discovered in the shallow margin of a pond in the outer fringe of trees on a pine "island." It was about two and one-half feet in diameter and was placed in a very exposed situation. A pair of cranes flushed from among the neighboring pines manifested considerable interest in this nest.

Nest No. 10. March 24. After an unsuccessful excursion for Burrowing Owl eggs, we were riding homeward about 6 P. M. and I was scanning a large prairie pond as a matter of routine, for we had neither seen nor heard a crane, when my eye was caught by a s.

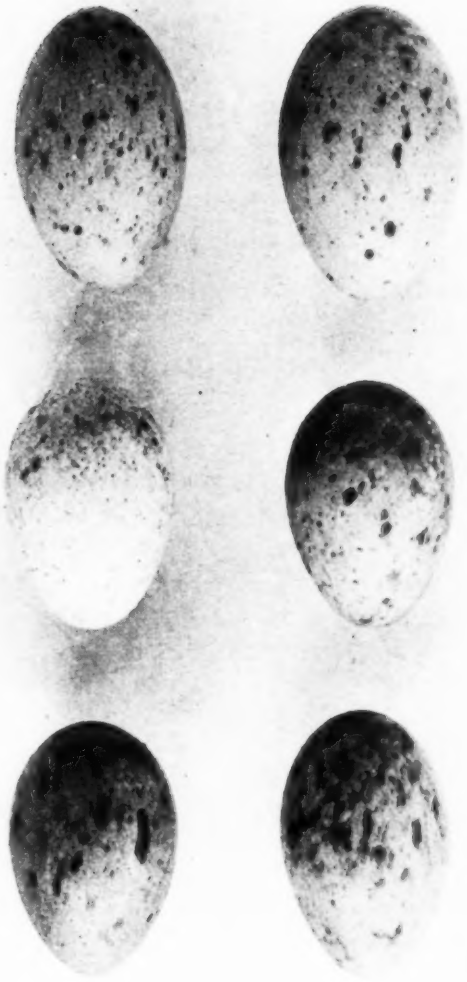

FIGURE 14. Eggs of the Sandhill Crane. Sets No. 219 (top), 218 (middle), and 215 (bottom), illustrating the variety of tones and markings.

gestive lump of gray out among the green pickerel weed. Investigation disclosed a Sandhill Crane sitting close, with head flat down on the nest in an effort to conceal the conspicuously red crown. This bird allowed an approach within fifty yards before flushing.

The nest, built entirely of dead pickerel weed, was a large, dry, firm structure about three feet in diameter with its surface raised several inches above the water, which was here about a foot deep. As the nest material would indicate, it was built among the green pickerel weed growing in the center of the pond. Of all that we examined this nest was the largest and highest above water (Figure 13).

The single egg (Set No. 220), which contained a small embryo, measures 96x59 mm. It is long-oval, sharply pointed, and in color pale olive-buff, marked with small roundish spots, principally about the larger end, of tints of olive-brown and lavender (Figure 15, middle egg).

Habits

It is natural to expect some diversity of habit in such a wide-ranging species as the Sandhill Crane, and upon comparing our notes with the few meager accounts of this species which have so far been published we find that the Florida birds have seemingly developed habits peculiar to themselves. The most striking of these is that the Florida cranes are not migratory, but spend their entire lives in the same general region where they are born.

The Florida birds too seem to follow a rather definite rule in their choice of nesting sites, whereas the species as a whole exercises considerable latitude. Baird, Brewer, and Ridgway[2] state that in southeastern Oregon Captain Bendire found the Sandhill Crane breeding on the lowlands as well as in the highest mountain valleys, and quote Cooper to the effect that it builds its nest on some elevated spot on the ground, among ferns, where it may be partly concealed, and yet whence the approach of danger can be perceived. Gundlach (as quoted by Barbour[3]) reports that the Cuban Sandhill Crane hides its nest under some bush or shady tussock of high, rank grass. While, according to Coues[4], Dall obtained eggs on the Yukon River that were laid in a small depression in the sandy beach, without any attempt at a nest[5]. Although Moore (quoted by Baird, Brewer, and Ridgway) found

[2]Baird, Brewer, and Ridgway. *The Water Birds of North America*, Vol. I. Memoirs Museum of Comparative Zoology, Vol. XII. Boston, 1884, pp. 409-412.

[3]Barbour, Thomas. *The Birds of Cuba*. Memoirs Nuttall Ornithological Club, No. VI. Cambridge, Mass., 1923, p. 59.

[4]Coues, Elliott. *Birds of the Northwest*. Misc. Publications No. 3, U. S. Geological Survey of the Territories. Washington, 1874, pp. 533-534.

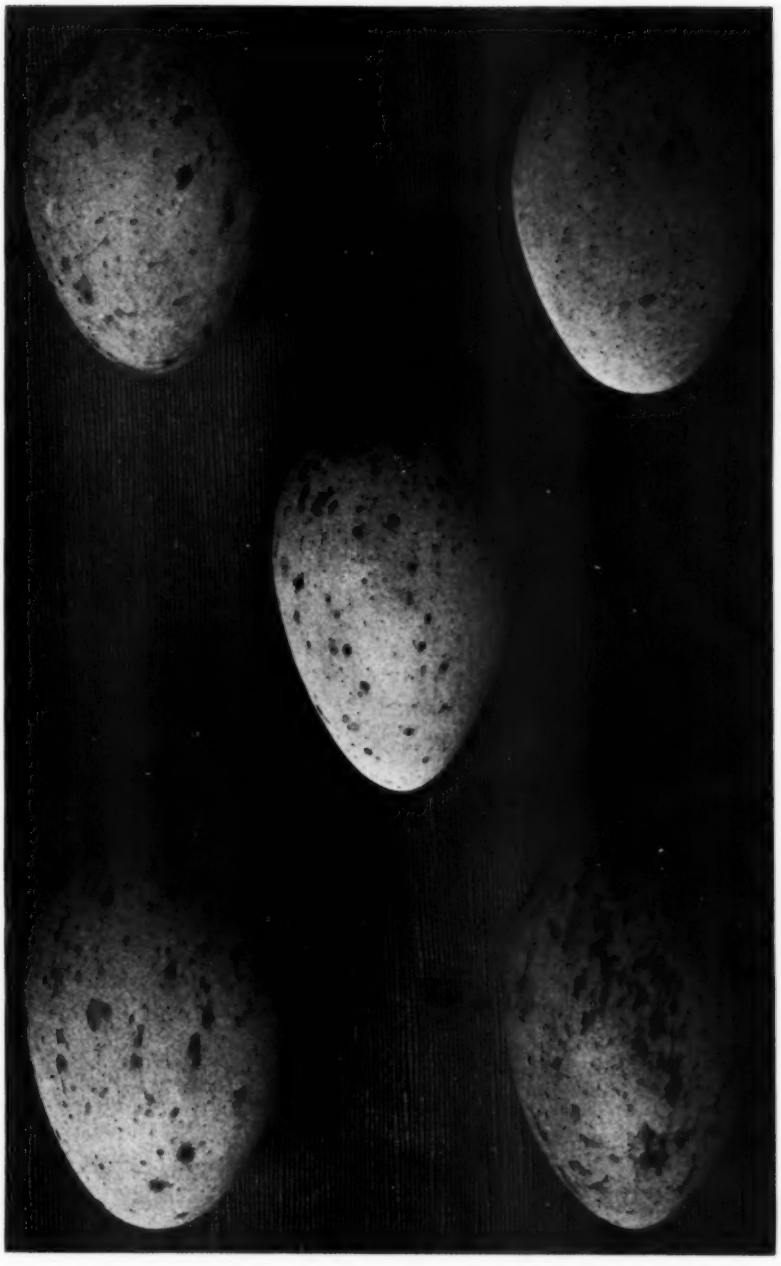

FIGURE 15. Eggs of the Sandhill Crane. Sets Nos. 218 (top), 220 (middle), and 217 (bottom right) illustrating the variety of form.

Florida nests placed on the dryest ground, among the saw-palmettos, and we were assured by Mr. Pearce that in wet seasons the cranes often resort to such places to make their nests, our experience would indicate that the normal nesting site of the Florida Sandhill Crane is a shallow pond, preferably its margin, wherein it can construct an island of its own. The season at the time of our visit was said to be exceptionally wet, and all the ponds were very full, yet only one of the ten nests we examined was built upon dry ground.

The dry-ground nests found by Moore were formed of pliable stuff, herbs, grasses, and the like, but never of stiff material or sticks. In one instance the nest was composed of grasses plucked up by the roots, with much sand attached. Our observations convince us that the choice of nesting material is purely a matter of convenience. The nests found by us were without exception constructed of the materials nearest at hand, whether they happened to be marsh grass, pickerel weed, "guinea cypress", or saw-palmetto.

The literature and our own observations indicate considerable individual variation in the time of nesting of the Florida Sandhill Cranes. Scott[6] writes that at Tarpon Springs the birds mate in January, build the last of that month or early in February, and hatch their young about March 1. Childs[7] took a set of two eggs in Manatee County on February 15. On March 11 a young bird which already stood two feet in height was brought to Bryant.[8] On the same date Bryant found a nest containing two eggs in which incubation had just begun; another, containing two fresh eggs, was found on March 15; and a third, also discovered on March 15, contained two eggs nearly hatched. Our first eggs were found on March 14 and were ready to hatch, while ten days later we found a new nest in which the eggs had not yet been deposited.

The eggs themselves exhibit the greatest diversity in both color and form. This is true of those of the birds of even a restricted area like the Bassenger region, as may be seen by referring to Figures 14 and 15. Nevertheless, it is remarkable that the greatest color difference among the eggs of our collection should occur between two

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[5]These were probably the eggs of the Little Brown Crane, a closely related form.

[6]Scott, W. E. D. *A Summary of Observations on the Birds of the Gulf Coast of Florida.* The Auk, Vol. VI, 1889, p. 152.

[7]Childs, John Lewis. [Letter quoted by Editor.] The Oologist, Vol. XIX, 1902, p. 56.

[8]Bryant, Henry. [Paper read before the Boston Society of Natural History.] Proceedings Boston Society of Natural History, Vol. VII, 1859-1861, p. 14.

eggs of the same set (No. 218; Figure 14, middle set, and Figure 15, top set).

Cranes, unlike their long-legged cohabitants of the ponds — the herons — are præcocial and their young are able to run about very shortly after hatching, but, according to Bryant the young remain with their parents until fully grown, and are fed for a long time by regurgitation. They do not fly until they are as large as the adults, but run with great speed, and hide like young partridges.

Cooper, so we are told by Baird, Brewer, and Ridgway, saw returning flocks of Sandhill Cranes passing northward over the Colorado Valley about the 13th of March. "At this season they rise from the ground by laborious flappings, circling around higher and higher, until they get so far up as to seem like flocks of butterflies, and they gradually move northward." Other authors mention the soaring of the Sandhill Crane, but in Florida such a phenomenon is never observed. The explanation of this is, no doubt, that soaring is correlated with migration, and the Florida birds are non-migratory. Apparently they never voluntarily take the air except to pass from place to place, and at such times rise to no greater height than necessary to clear the obstacles in their paths.

According to Baird, Brewer, and Ridgway, the Sandhill Crane does not usually frequent the seashore, nor it is often found in wet places, but prefers dry prairies, ploughed fields, sandy hills, and like places, and in this respect is unlike the heron family. Barbour says the Cuban Sandhills are not often seen about water. The Florida birds, it is true, spend a large part of their time feeding on the dry prairie, and, as in other regions, are attracted by burned areas, but their lives are so centered about the ponds, and they were so plainly attached to the river marsh that we find it impossible to disassociate them from a watery environment.

A Warning

In days gone by the Sandhill Crane bred over most of the great interior plains of North America, from western Canada southward, and during migration was often found in large flocks. Coues relates that thousands of Sandhill Cranes repaired each year to the Colorado River Valley, flock succeeding flock along the course of the great stream, from their arrival in September until their departure the following spring. Those immense flocks are now no more, and as a breeder the bird has withdrawn farther and farther to the north until today its nest is rarely round in the West south of the Canadian border. Moreover, it is found in no great numbers north of it. Recent faunal

papers indicate that the species is nowhere common west of the Mississippi, though it is resident in small numbers on the coast of Louisiana; east of the Mississippi it is almost unknown except in extreme southern Georgia and in Florida.

Florida, in fact, is generally agreed to be the Sandhill Crane's last stronghold. But alas! it is far from strong. Heretofore, inaccessibility of the country inhabited by the cranes has limited their human enemies to the natives who shoot them for food only, or to the occasional collector who takes a few specimens of the birds or robs them of a few sets of eggs. Now, the situation is different. Even as I write, a project is well under way to pave the road of deep sand between Sebring and Okeechobee, and probably before this article leaves the press a continuous stream of automobiles will be flowing through the very heart of the crane country.

The ultimate result of much "improvement" is as obvious as it is inevitable. Notwithstanding its extreme wariness and great sagacity, the Sandhill Crane must surely give way, like the Seminole Indian and the Ivory-billed Woodpecker, before this ruthless encroachment upon its retreats. Its wild note can not compete with the honk of the automobile.

Must the last of the Sandhill Crane's prairies be converted into worthless farms while countless acres of good arable land lie idle in near-by states? Must the tourist's automobile be given right of way through the last remaining wild spots? No! The Sandhill Crane is too splendid a creature to be thus swept out of existence. Its preservation must be considered in any scheme designed to open up interior Florida, but only the powers of State or Union are strong enough to confound the real estate promoter and hold some of the "waste places" inviolate. And there is no time to lose.

ACKNOWLEDGMENTS

The frontispiece is from the brush of Mr. George Miksch Sutton, to whose kindly interest a valuable feature of this paper is due. So far as I am aware, the Sandhill Crane has not before been depicted in crouching posture.

For assistance and unfailing courtesy in the field, our grateful thanks are extended to Messrs. W. Sid Pearce and Marvin H. Chandler, of Bassenger. True sons of Florida, simple and unspoiled, these men are as devoted to their native haunts as are the Sandhill Cranes them-

selves. Even now I can see, beneath a broad Stetson, the contented smile stealing over Pearce's weather-beaten features while he surveys his far-flung prairies, and the kindly twinkle in his eye as he turns in his saddle to ask, "Have you ever seen a purtier country than this?" And I can still answer with conviction, "I never have."

MONTGOMERY, ALABAMA.

THE DECLINE OF THE JACKSNIPE IN SOUTHERN WISCONSIN

BY ALDO LEOPOLD

The purpose of this paper is to present evidence of a recent decrease in jacksnipe or Wilson's Snipe (*Gallinago delicata*), to the end of stimulating action for the conservation of this bird and its habitat.

Its original abundance in the Mississippi Valley was probably beyond our present imaginative powers. Bogardus[1] (1874) killed 340 in a single day on the Salt Creek bottoms of the Sangamon River, and wagered to kill 100 straight in a day on this area. There were no takers. He says: "Our bag was seldom as small as seventy-five couple at the right time. . . . Snipe are vastly more abundant in the West . . . than in the East."

Kumlien and Hollister[2] (1903) say of the jacksnipe: "still common . . . [but] . . . we should be at a loss to express its numbers in former years." This refers especially to Walworth County, Wisconsin, where Kumlien began his observations about 1868.

Schorger[3] (1929) gives the jacksnipe as an abundant migrant in Dane County, but states that "a gradual decrease in numbers has taken place during the last fifteen years."

The extent of this recent decline may be roughly measured by means of the following table and chart, compiled from Schorger's ornithological notes for 1919-1929, and my shooting journal for 1924-1929.

The table reduces the number of jacksnipe seen and killed by each of us to yearly averages of the number "seen per trip" (Graph A) and the number "killed per hunt" (Graph B). The reason for distinguishing "trips" and "hunts" is that Schorger made many trips during

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[1]Field, Cover and Trap Shooting, A. H. Bogardus, J. B. Ford & Co., N. Y., 1874, p. 136.

[2]Birds of Wisconsin, L. Kumlien and N. Hollister, Bull. Wis. Natural Hist. Society, Nos. 1-3, April-July, Milwaukee, 1903.

[3]Birds of Dane County, Wis., A. W. Schorger, Trans. Wis. Acad. Science, Vol. XXIV, Nov., 1929.

which no hunting was done. In both cases trips and hunts varied from a quarter day to a full day in length, and all were made in or near Dane County.

My journal records the length of each hunt, so that I was able to reduce my figures to terms of jacksnipe seen and killed per full day (Graphs C and D). The table, for simplicity, omits these calculations, but the greater smoothness of graphs C and D, as compared with A and B, reflects the removal of the disturbance due to varying lengths of time in the field.

The downward trend of all four graphs is apparent at a glance. A median line, drawn by averaging coordinates in groups of three, has been added to Graph A in order to show its general trend, as distinguished from its temporary fluctuations. A downward trend is apparent in all the graphs except B, and is clear in this case when figures have been reduced to kill per full day on Graph D. The chart, therefore, indicates a progressive decrease in the abundance of jacksnipe in Dane County. Can this apparent local decrease be accepted as actual? If so, does it reflect a general decrease?

A downward trend in birds killed might reflect poorer shooting rather than fewer birds. That there was no significant deterioration in my own shooting is indicated by data in my journal on shells per bird in bag up to 1926. As for Schorger's shooting, my impression is that it has improved rather than deteriorated. Both of us have used the same guns and I used the same dog throughout the period covered. Even if there were no data on marksmanship, however, the downward trend of birds seen would still indicate a decrease. Moreover, the graphs make no allowance for increasing skill in where and how to seek birds. At the time our records begin I was new to the region, and Schorger had never hunted snipe systematically. That we have both learned something about their local habits is shown later on. In my judgment, even a horizontal trend in the various graphs would be reason for suspecting a decrease.

Another explanation of the downward trend of all graphs might be that local shortages in food and water caused the migrating birds to pass over or around this locality. In so far as known, jacksnipe food is a function of water. The water in the remaining snipe marshes of Dane County is comparatively stable, because the marshes either lie at the level of artificially stabilized lakes, or are spring-fed, or both. Late summer and fall rainfall makes some difference, even in spring-fed or lake-level marshes, but not nearly so much as in marshes fed entirely by river overflow or by rain. Rainfall figures for August

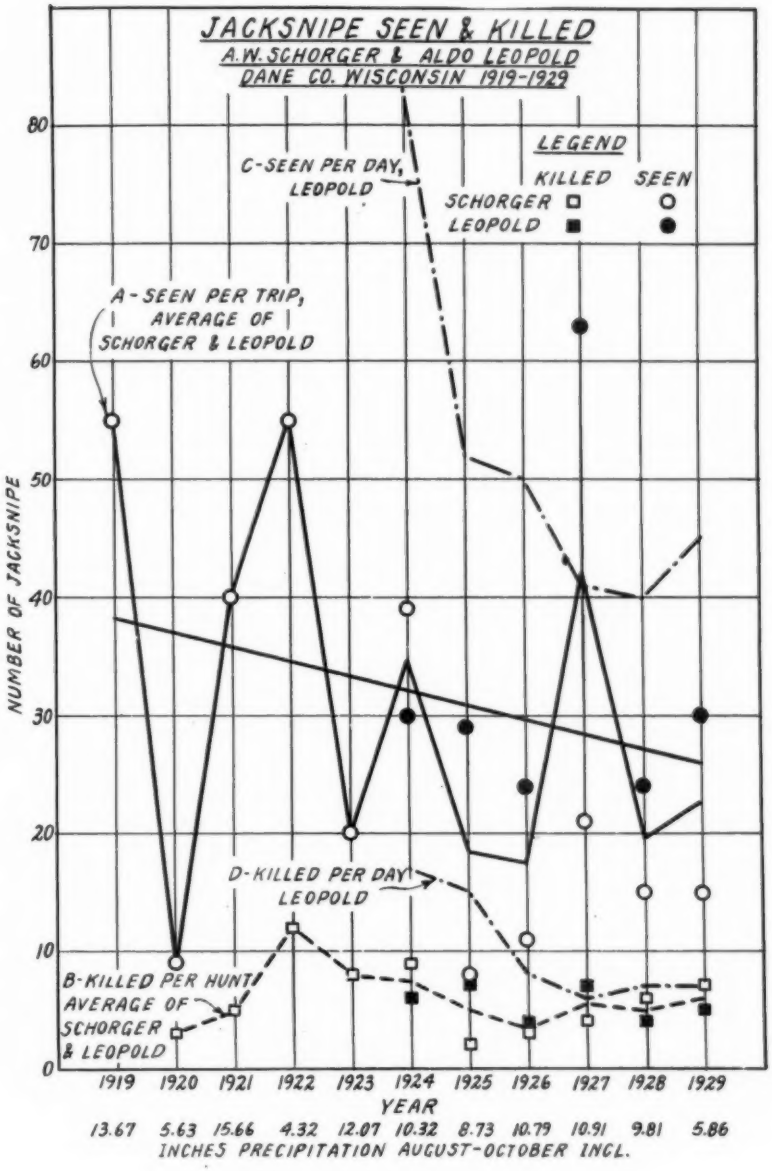

FIGURE 16. Graph showing diminution in number of Jacksnipes seen or killed from year to year during these studies.

to October of each year are entered at the bottom of the chart. I do not recall any year in which there was either a great shortage or a great surplus of snipe-water throughout an entire shooting season.

Insufficient grazing might have reduced the attractiveness of our local snipe grounds, and thus account for an apparent decrease in birds seen and killed. It is not likely to have affected these figures, however, because Dane County is in the heart of the Wisconsin dairy belt, in which both the number of cattle and the allocation of areas used as pasture are quite constant from year to year. Snipe ground must ordinarily be grazed in order to be good, apparently because ungrazed ground does not offer enough exposed mud. The muddy or boggy shorelines of receding ponds are used when available, especially early in the season, regardless of whether grazed or no, but this exception merely proves the rule.. Late November birds often resort to floating bogs covered with heavy ungrazed vegetation, but this is during cold weather. Apparently under such conditions the shelter-value of the vegetation offsets its obstruction of free access to the mud. Moreover, these floating bogs are then often the only ground left unfrozen. (These are all things Schorger and I have learned during the period covered by the graphs.. If the supply of birds had remained constant, this added knowledge should have produced a rising trend both in snipe seen and snipe killed).

Drainage might be another source of error. It is estimated that the available ground in Dane County has been shrinking at the rate of perhaps ten per cent per year by reason of new ditches. At this writing there are practically no large snipe grounds left except at lake-levels, where drainage can be effected only by pumping, and hence is seldom attempted. Numerous small upland potholes and springheads, however, still remain undrained. Ditched ground is usually worthless, even when wet by rains, and is avoided in hunting. Hence the only way for drainage to mave invalidated these figures is by switching the migration route. I cannot appraise the probability of such a change, except to say that since there is still enough ground to hunt on, there would appear to be still enough to detain a normal density of migrating birds.

The actuality of the seeming decline in snipe is corroborated by the reports of local ornithologists on the spring migration, at which season the birds are not dependent on undrained marshes. For several years past the local bird-men, who each spring scour much country in search of other birds while the hunters are not afield, have been reporting a scarcity of snipe.

Jacksnipe Seen and Killed

A. W. Schorger and Aldo Leopold, Dane County, Wisconsin, 1919-1929.

1919

Date	Schorger Seen	Killed
9-27	40	*x
10-11	50	x
10-26	75	x
	165	
Seen per Trip	55	
Killed per Hunt		x

1920

7-24	7	x
8-1	6	x
8-8	3	x
9-18	8	x
9-25	25	3
11-25	4	x
	53	3
Seen per Trip	9	
Killed per Hunt		3

1921

9-18	25	x
9-24	30	2
10-22	100	13
10-23	6	1
	161	16
Seen per Trip	40	
Killed per Hunt		5

1922

8-13	8	x
8-20	6	x
9-24	20	x
10-7	200	12
10-12	80	13
11-5	15	x
	329	25
Seen per Trip	55	
Killed per Hunt		12

1923

Date	Schorger Seen	Killed	Leopold Seen	Killed
7-28	2	x		
9-8	35	x		
9-29	25	9		
10-6	60	13		
10-21	1	x		
10-28	12	6		
11-10	5	2		
	140	30		
Seen per Trip	20			
Killed per Hunt		8		

1924

9-28	3	1	4	2
9-30			15	3
10-1			3	1
10-2			15	2
10-4			15	4
10-7			6	2
10-12	50	x	30	7
10-14			50	9
10-18			50	14
10-19	75	20		
10-22			100	9
10-25	30	6		
10-26			20	6
10-28			60	9
11-4			40	11
11-9			7	6
	158	27	417	85
Seen per Trip	39		30	
Killed per Hunt		9		6

*The symbol x means no hunting done.

1925

Date	Schorger Seen	Schorger Killed	Leopold Seen	Leopold Killed
9-13	1	x		
9-26	4	x	30	11
9-27			20	4
10-10	1	1	40	10
10-11	9	0	50	14
10-17			50	11
10-18			25	2
10-22			50	12
10-24	20	2	25	8
10-25	2	0	10	1
10-31	8	1	50	9
11-1	20	5	25	10
11-7	12	7		
	77	16	315	92
Seen per Trip..	8		29	
Killed per Hunt		2		8

1926

8-28	5	x		
8-29	3	x		
9-19	14	x		
9-21	6	1		
9-25	7	1	20	7
9-26	9	x	12	3
10-2	15	4		
10-3			3	0
10-4			3	1
10-7			20	3
10-8	20	6		
10-9			35	5
10-10			2	0
10-15	7	4		
10-16	2	1	1	1
10-17	30	5	30	6
10-23			100	11
10-30			30	6
	118	22	256	43
Seen per Trip..	11		24	
Killed per Hunt		3		4

1927

Date	Schorger Seen	Schorger Killed	Leopold Seen	Leopold Killed
8-13	24	x		
8-27	15	x		
9-10	17	x		
9-16			?	6
9-23	16	x	15	6
9-24	30	5		
10-1	9	1		
10-8	40	5		
10-15	15	4	100	10
10-22			75	5
	166	15	190	27
Seen per Trip..	21		63	
Killed per Hunt		4		7

1928

9-22	2	x	1	1
9-23	12	x		
9-29	9	x	30	4
10-2			50	9
10-6	25	11		
10-13	30	5		
10-14			40	6
10-20	12	5		
10-27	12	2		
11-11			1	1
	102	23	122	21
Seen per Trip..	15		24	
Killed per Hunt		6		4

1929

9-14	3	x		
9-19	30	7		
9-21	20	6		
10-4	30	15		
10-8			20	7
10-12	7	x		
10-13			40	4
10-15	20	6		
10-19	30	11		
10-20	11	x		
11-3	30	5		
11-9	6	x		
11-16	2	0		
	162	50	60	11
Seen per Trip..	15		30	
Killed per Hunt		7		5

All of the foregoing evidence pertains to Dane County and its immediate environs. In order to get a rough check on conditions elsewhere in the state, twelve selected jacksnipe hunters, all from different counties, were asked for their opinion on recent trends. Of these, five reported no perceptible change in recent years, six reported a decline, and one reported that recent flights have been more sporadic than formerly.

Taking everything together it is my conclusion: (1) that the jacksnipe in the region of Dane County, Wisconsin, has decreased perhaps fifty per cent since 1924; (2) that this may be due to their passing over or around us, or to a temporary abundance cycle, or to an actual decrease in the available supply; (3) that the only reason for doubting an actual decrease in the available supply would be positive evidence that they have increased or held their own in the rest of the Mississippi Valley.

If there is any such evidence of increase, I have not seen or heard of it. Such slight evidence as I have for the remainder of Wisconsin indicates that the decrease here indicated for Dane County has been statewide.

The possible causes of the decrease are a matter of conjecture. One likely cause is the shrinkage in southern breeding ranges, which were possibly the most productive. Bogardus[1] says that jacksnipe formerly bred as far south as the Calumet River and the great Winnebago swamp in Illinois, whereas Schorger[3] is in doubt whether they still breed in Dane County. The twelve snipe hunters whom I questioned concerning the status of jacksnipe elsewhere in Wisconsin reported their breeding in Sheboygan, Winnebago, Rusk, and Sawyer Counties. The most southerly of these is Sheboygan. From this, their present known southerly limit, to the Calumet River in Illinois, their probable southerly limit in 1874, is 120 miles.

The only really comprehensive check against the further shrinkage of marshes would be to accord undrained marshes a special tax status in view of their public service to migratory birds, just as ungrazed farm woodlots and managed forests are beginning to be accorded a special tax status in view of their public value to watersheds and timber supply.

Overshooting of jacksnipe doubtless occurs, but not so far in southern Wisconsin. The majority of hunters pay no attention to them as yet, but the number who do so is rapidly increasing.

As nearly as I am aware, the diseases, parasites, and predatory enemies of the jacksnipe are unknown, and their food nearly so. An

adequate life-history study would seem to be one of the obvious first moves toward a conservation program.

NOTE: Since preparing this manuscript I obtained from Mr. D. H. Haines of Ann Arbor, Michigan, through the kind offices of his shooting companion, Prof. Kenneth McMurray of the University of Michigan, a digest of the former's Shooting Journal by days. This is summarized by years as follows:

JACKSNIPE KILLED IN MICHIGAN
BY DONALD H. HAINES

Year	Place	No. Killed	No. Hunts
1918	Kalamazoo	68	21
1919	Kalamazoo	47	26
1920	(Absent from State)		
1921	Ann Arbor	14	11
1922	Ann Arbor	7	13
1923	Ann Arbor	15	14
1924	Ann Arbor	31	23
1925	Ann Arbor	0	15
1926	Ann Arbor	1	10
1927	Ann Arbor	9	11
1928	Ann Arbor	18	18
1929	Ann Arbor	90	18
Total		300	180
Average		27	16

Mr. Haines' bag of snipe was obtained in conjunction with and sometimes incidental to a good deal of marsh duck hunting, hence his figures are not so direct an index to abundance as Schorger's or my own. For this reason they were not added to the graph. Nevertheless he assures me that whenever snipe were present in any numbers he usually hunted them. With respect to frequency, length, and regularity of hunts, his practice resembles Schorger's and mine.

Mr. Haines' Ann Arbor bag was above average in 1924 and 1929. (The exceptionally high 1929 figure was coincident with leasing some favorable marsh and hunting it oftener than usual). Our graphs show high in 1922 and 1924, and indicate an improvement in 1929.

Mr. Haines' bag was low in 1922, 1925, 1926, and 1927. Our graphs show low in 1920, 1923, 1925, 1926, possible 1927, and 1928.

The comparison is contradictory in only one year, 1922, and shows enough correspondence to suggest that Michigan and Wisconsin may both feel the same fluctuations in abundance.

GAME SURVEY,
MADISON, WIS.

FLUCTUATION OF BIRD LIFE WITH CHANGE IN WATER LEVEL

BY E. L. MOSELEY

In the late spring of 1929, the water in Lake Erie became higher than it had been previously for nearly half a century. It was three feet higher than in May, 1926. In the Sandusky region and farther west, the water was probably never so high before. The western part of the lake gradually deepens because of slow subsidence of the land, as shown in my "Formation of Sandusky Bay and Cedar Point." There are no long-time continuous gage readings showing the water level anywhere west of Cleveland, where the lake was as high in July, 1876, as in May, 1929. The recent high water in the upper lakes and in Lake Erie was due in part to more than the normal precipitation in this region in the fall of 1928 and much more than normal in the first half of 1929. At Sandusky, the excess from January 1 to May 31, 1929, amounted to 6.17 inches. In other words, nearly fifty per cent more rain than usual fell in the first five months of the year. At the end of October the excess amounted to 8.06 inches. The high water in Lakes Michigan, Huron, St. Clair, and Erie was due also to the opening of sixteen locks in St. Mary's River at Sault Ste. Marie from August to December of 1928, dumping millions of cubic feet of water into Lake Michigan every minute, to lower Lake Superior, where high water was threatening the operations of the power plants.

The high water favored the marsh birds in two ways: it afforded more food, it made it harder for four-footed enemies to get to them and their nests. In 1929, some important items of food for these birds were many times as abundant as they had been for several years before. Wild rice, which in periods of moderately high water had been common in the Sandusky marshes, had become scarce during the low water period of 1923 to 1927, but the roots were not dead, so that when sufficient water covered them the plants grew up and fruited again. The bladderwort (*Utricularia vulgaris*) forms hibernacula (winter buds) which sink to the bottom and avoid the ice but are floated to the top in the spring by gas bubbles that form in them. These hibernacula, when abundant, form an important part of the food of coots, and perhaps of other birds.. For several years previous to 1928, extensive areas of marshland had too little water for the proper development of these plants but the high water of 1929 enabled them to make a luxuriant growth. In their bladders are caught crustacea and other animals. Whether birds get any animal food from these plants, I do not know. In 1929, duckweed covered

large expanses of quiet water, where for several years previously there had been only mud.

The three kinds of plants just mentioned afforded many times as much food in 1929 as in any one year from 1923 to 1927. The same is probably true of *Vallisneria*, or tapegrass, *Potamogeton*, or pondweed, and other aquatic plants. The lotus (*Nelumbo lutea*) was formerly found in such abundance in marshes east of Sandusky as to enable some enterprising boys to pay a large part of their school expenses by going in a power-boat to gather the buds and opening blossoms, which they sent to Cleveland. These beautiful plants had almost died out because of low water, but in 1929 showed signs of reviving.

During the years when the water was low, minks, weasels, raccoons, skunks, and other predatory mammals could easily make their way to most parts of the marsh without much swimming. Nesting birds were in danger. High water has changed this. Moreover, raptorial birds have become scarce, the little Screech Owl and the Marsh Hawk being now the only ones that are frequently seen.

For several years past birds of many kinds have increased over the country generally, because of a growing sentiment in their favor, more bird sanctuaries, altered game laws, sustained activities of game wardens, of Audubon Societies, and of Isaac Walton Leagues. This protection has affected directly the bird population of the marshes about Lake Erie. It has also increased the number of birds coming to these marshes from the south and other directions. However, there would not have been such a large increase in the number that made their home and reared their young here if they had not found more abundant food than in previous years.

For most of the facts regarding the number of birds in the Sandusky marshes in 1929, and the increase of certain aquatic plants which afford them food, I am indebted to my former pupil, Henry Graefe, who was a surgeon in the World War. For several summers past he and his family, all of them nature lovers, have spent much time upon or close to the marsh of the Wyandotte Shooting Club about six miles east of Sandusky. This marsh is well guarded from poachers. He thinks that fifty times as many King Rails, gallinules, and Coots were hatched there in 1929 as in any one of several previous years. In marshes west of Sandusky gallinules and Coots were even more abundant. Soras and Virginia Rails showed a noticeable increase but less than the preceding species.

American Bitterns were heard more frequently than usual and Great Blue Herons were very numerous. About a hundred were in sight at one time, perched on spiles in the lake. These herons have increased over a wide territory, due, no doubt, to better protection. For the same reason, two American Egrets were seen by Dr. Graefe east of Sandusky and by observers in other places in northern Ohio in July or early in August.

Of ducks, the most notable increase was in Wood Ducks, many of them reared in the marsh. Several times in September, he observed a hundred or more at a time. Men employed to guard the marsh said they had seen as many as 500 Wood Ducks. Gadwalls, although they do not stay in the marsh continuously, were more numerous than for five or six years before.

Mallards, Black Ducks, and red-legged Black Ducks, were about as common as in previous years; teals of both kinds were rather more numerous than usual, Pintails less numerous. More Pied-billed Grebes were seen than usual.

State Normal College,
Bowling Green, Ohio.

THE ECONOMIC IMPORTANCE OF BIRDS AS INSECT PREDATORS

BY C. N. AINSLIE

On the surface this may seem a simple subject to discuss. We all know that many birds live on the insects they capture and we also know that insects are always on hand to be eaten, so what is there to talk about? The bugs eat the gardens and the birds dispose of the bugs and save vegetation, consequently the birds are the salvation of the gardeners and the farmers.

I suspect this is the general and popular view of this subject, particularly among ornithologists, many of whom imagine that farming would be a failure if it were not for the birds that control and destroy insect pests. Like most questions, economic ones especially, there are two sides to this one and I want for a few minutes to turn it around so both sides may be seen.

We are aware that animate nature is a tremendously complicated affair, with all its forms of life, animal and vegetable, so intimately combined and correlated that it is simply impossible to deal with or even discuss any one section of this vast complex and ignore any other part. No one realizes this more than an entomologist, who is,

in economic work particularly, continually endeavoring to solve the problems of life histories in order that the relations of insects with one another and with the entire structure of the world around them may be clearly understood. It is a well known fact that there are very few organisms, plant or animal, simple or complicated, that do not have, somewhere in their life cycle, some critical period when they are vulnerable, when they offer the least resistance to outside attack. This fact is really the basis of our work as members of the Federal Bureau of Entomology and it is only because of this fact that insects do not multiply to such an extent as to drive us from the earth.

The enormous possibilities of insect multiplication are not generally appreciated by those who are not entomologists, and it may be worth while to mention this angle of the subject in passing in order to get some conception of the great menace of the insect world. Of course it must be understood that, fortunately, the theoretical and actual figures do not coincide; nevertheless the theoretical figures are given below.

Many of our crops are attacked and destroyed by the larvae of certain moths and beetles. The adult females of many of these moths and beetles deposit something like 300 eggs each.. The first female moth or beetle will place, the first year, say, 300 eggs.. These will hatch and the following year there will be 150 pairs. 150x300=45,000. The second year there will be 22,500 pairs. 22,500x300=6,750,000. All this in three years from a single female. Now supposing, as is often the case, that there are 1,000 females in one field, you can estimate the enormous increase that might result. Figures similar to these may be theoretically true of a great many of our farm and garden pests and some of these pests can make an even better showing.

You may not be acquainted with the classic illustration used by Thomas H. Huxley in demonstrating the tremendous possibility of multiplication of plant lice. These plant lice, or aphids, are about the size of a large pinhead, their bodies are mostly liquid and they can be crushed by a mere touch. Assuming that an aphid weighs but 1/1000 of a grain and that it requires a very stout man to weigh more than 2,000,000 grains, Huxley shows that from a single aphid the 10th brood alone would contain more weight than 500,000,000 men, or more than the entire population of China. Buckton, an eminent English scientist and student of aphids, criticises these figures as being much too small. He says that if a single aphid, such as one sees on rose bushes, should begin to reproduce and each individual should live but twenty days, at the end of 300 days the living indi-

viduals would number almost 33 quintillions, equal to the weight of 1,638,400,000 men. Another mathematician figures the problem another way and proves that the total number of living aphids that could be produced from a single female in one season would be represented by 210 raised to the 15th power, a number almost impossible to express in figures. If these computations are new to you they may impress you with some idea of what the human race is up against in its fight with the insect world for existence or even for standing room.

I have said that these figures are theoretical and not actual. I suppose the only thing that prevents them from becoming actual is the presence of various destructive agencies with ability to keep down these staggering totals. There are many of these agencies busy every minute, some of them strikingly apparent, others effective but not visible, always engaged in unceasing warfare against the enormous increase of insect life. The great army of insect-eating birds is aggressive in this fight and these birds are entitled to full credit for their efforts in our behalf. Under normal conditions these birds seem able to secure enough insects for their daily needs, for themselves and their offspring. The numbers of these birds remain about the same year after year in the same locality. The constant fatality to bird life probably accounts for the lack of increase in any given neighborhood although countless broods are launched on the air each year.

As I have said, under normal conditions these birds appear to find enough insects for their needs. Now suppose some insect pest eludes its parasites or other enemies and its numbers are, for the time being, increased a thousand fold. The birds that feed on it cannot by any trick of reproduction multiply in time to diminish the pest to an appreciable degree, especially if the outbreak covers a large area, as is often the case. The percentage of any insect that will be destroyed by birds naturally drops far below normal in case of an outbreak. A few sporadic cases are on record, exceptions to the general rule, where birds have moved in, concentrated and effectively reduced the numbers of the marauders. But even in such cases nature depends very largely on parasitic control and is justified in doing so. If cutworms increase birds will manage to find a few of them. But the cutworm has at least a dozen species of parasitic enemies, and if one of these species should happen to be at a low ebb as to numbers there are usually plenty of others that will come to the rescue and subdue the common enemy. If man is to exist on the earth the equilibrium must be maintained by some means.

In this connection it may be in order to explain, before going farther, that a parasite is an insect that lives on or in some other insect and is dependent on that insect for its food supply. Parasites are of an almost infinite variety of size, shape, and habit. They become adapted to their environment and their presence adds greatly to the complexity of the study of insects. They form one of the chief factors in insect control even though often microscopic in size. In New Mexico, years ago, I watched a tiny parasite drilling into the eggs of a moth in the heads of kaffir corn, placing its own egg within the other egg, the moth's egg being about the size of a grain of mustard seed. From one of these I reared three parasites that had found sufficient nourishment within that small egg to bring all three to maturity. Other parasites are even much smaller than these. One species, barely large enough to discern without a lens, is very important in the control of the Hessian fly which is a serious enemy of the wheat crop. Some years ago I dissected one of these very small Hessian fly parasites and counted approximately 3500 eggs in her ovaries.

The point I am making is that, useful as birds are in their way, they can seldom be depended on, unaided, to rid us of our insect enemies. Especially is this true in an emergency when quick relief is demanded. The fact that parasites are able to multiply in prodigious numbers at times, whereas birds are very limited in their ability to increase, marks one difference between these friends of men.

The much advertised corn-borer affords an interesting note on the situation I am trying to describe. The corn-borer comes from Italy or at least is present in that country. And it is said to do very little damage there. Italy is one part of Europe where birds are few in number owing to the fact that even the song birds are used for food at times. When the borer reached the United States, where birds are protected as in no other country on the face of the earth, the borer at once became a menace and remains so to this day. Our birds seem to be useless as far as this problem is concerned. When the parasites now being imported from Italy are distributed and acclimated it is hoped that the corn-borer will become less harmful, but the birds will get little credit unless they get busy.

One fact of importance should be borne in mind in this discussion, namely, that control of insects by birds depends wholly upon the numbers and the appetite of the birds concerned. No matter how many birds are busy, as soon as they are sated with food they are at

the end of their usefulness for the time being. On the other hand, in the case of parasites, appetite has nothing to do with the limitation of their work. With them it is merely a problem of hunting their victims on or in which to place their eggs. The more victims they can find in a given length of time, the more eggs are placed, since, as a usual thing, their supply of eggs is practically unlimited. It seems to me that these facts will explain why parasites have checked so many outbreaks and why birds are so often powerless in the matter of control. Do not understand me to be minimizing the value of birds in their every day labors against injurious insects, but my observations would lead me to believe that they are often overrated. During my twenty-three years of official work I have been in immediate contact with a number of serious insect outbreaks and in no case have birds accomplished any noticeable reduction in the numbers of the pest. One grasshopper invasion below Flagstaff in Arizona was attended by great numbers of blackbirds that captured a small percentage of the hoppers but really interfered but little with their activities.

The Pale Western Cutworm in North Dakota has been attacked in a limited way by the Horned Lark, but the labors of this beautiful bird make only a feeble impression on the numbers of the cutworms in the wheat fields. Other pests such as the Hessian fly, the wheat stem sawfly, and the chinch bug are none of them such as birds can in any way control even to a limited extent. They can be suppressed only by parasites or by cultural methods.

It has always seemed to me that the habit of placing emphasis on the money value of birds is unfortunate for it commercializes them in the same way that many of our blessings have been cheapened. To protect birds because they are an asset to a growing bank account may be good business but it detracts from the esteem in which birds are held or should be held because of their grace and beauty and companionship and song. Our country, even if birdless, would not become a desert, but it would lack the presence of one of the most attractive features of our wild life. And it goes without saying, that, apart from their economic value, they should be protected in every possible manner, both by law and by community support.

U. S. Bureau of Entomology,
Sioux City, Iowa.

BIRDS OF THE YELLOWSTONE NATIONAL PARK, WITH SOME RECENT ADDITIONS

BY EMERSON KEMSIES

This past summer (1929) I had the privilege of working in Yellowstone Park as Ranger Naturalist. During that time I prepared a revised check-list of the birds of the Park. The following paper includes notes on species not previously recorded, and a revised check-list of the birds known to occur in the Yellowstone Park.

The Park has an area of 3427 square miles, being approximately fifty-five miles east to west, and sixty miles north to south. Elevations range from about 4,000 feet at the North or Gardiner Entrance to about 11,000 feet on some of the surrounding mountains. The largest part lies at an elevation of from 7,000 to 8,500 feet. Yellowstone Lake with an area of 139 square miles and a shore line of 100 miles lies at an elevation of 7,740 feet.

The Park presents in a comparatively small area a wide variety of habitats, making conditions favorable for a large and varied bird life. I have listed 209 species of which six or seven may be regarded as accidental or casual. In addition there are five or six species which one is justified in listing as hypothetical.

The whole Park has never been thoroughly worked over by an ornithologist. Mr. M. P. Skinner, the first Park Naturalist (1921-1922), has written a bulletin listing 202 species, which was published in 1925 by the Roosevelt Wild Life Experiment Station of Syracuse University.

It is certain that a year spent in the Park in a study of the bird life would bring very worth-while results. Large sections of the Park which are probably richest in bird life are away from the main trails and rather difficult of access unless one has a great deal of time. One section in particular, the southwest corner of the Park, or Bechlar River region, should be carefully worked. It is from this region that regular reports are received of the breeding of the Whooping Crane.

Dr. T. Gilbert Pearson, president of the National Association of Audubon Societies, while on the Boundary Commission Survey this past summer reported seeing two young Whooping Cranes. The permanent ranger at the Bechlar River station later wrote saying he had located the adults. The permanent rangers' duties are so heavy that they have little time or inclination to devote to the intensive study of any field of natural history.

The Ranger Naturalists, all but two of whom serve only for the three summer months, have very little time for research under the

present system. Naturalists are stationed only at those parts of the Park where they can come in contact with the largest number of tourists.

The following are birds that were seen for the first time this summer.

Red-throated Loon. *Gavia stellata.* First seen June 28, 1929, at West Thumb, the western side of the Lake near its southern end, by Mr. Dorr Yeager, Permanent Park Naturalist, and myself. It being evening we unfortunately did not have time to look for a nest. I returned to the section on July 15 and at that time found two young together with the adults. Bent (1919), in his *Life Histories of North American Birds, says,* "Stray birds occasionally summer in the United States and southern Canada. Said to have bred once at Pittston, Pennsylvania." Otherwise I can find no mention of this species as a summer resident in the United States.

Marbled Godwit. *Limosa fedoa.* Identified June 29, 1929, on the Molly Islands in Yellowstone Lake for the first time. These islands are in the southeast area of the Lake and are rarely visited except a few times a year by the men connected with the Bureau of Fisheries. Two of the godwits were seen and identified by Mr. H. C. Jones, instructor with the Oberlin Ecology Party, and myself.

It is on these islands that one of the few remaining breeding colonies of the American White Pelican remains. There were about 150 nests of this species each with one or two young in it. Most interesting was the cannibalistic habit of this bird. In all cases where two birds occurred in a nest one was much larger than the other. I doubt whether any nest in this colony would successfully raise more than one young. Although the young ones were still entirely naked the oldest one had already succeeded in killing the younger one in a good many nests.

Eggs of the Caspian Tern and downy young and eggs of the California Gull were found on the islands also.

Western Grasshopper Sparrow. *Ammodramus savannarum bimaculatus.* I found several pairs breeding in the meadows around the Upper Geyser Basin. I did not find any nests but males were heard singing daily throughout the breeding season. Apparently the first record for the Park. Probably overlooked or not distinguished from the Western Savanna which has been recorded from most meadowland sections of the Park.

Sprague's Pipit. *Anthus spraguei.* Several were seen July 10 at the Lower Geyser Basin. Apparently the first record.

Audubon's Hermit Thrush. *Hylocichla guttata auduboni.* Listed by Mr. Skinner as an uncommon breeder. I found at least ten pairs this past summer, three or four in a rather small area around Mammoth and the rest at the Upper Basin.

Park Ranger Albert Bicknell of the Bechlar River district, sent me a perfect description of the Scott's Oriole (*Icterus parisorum*) saying he had never seen the bird before, and that a pair had bred near the Ranger Station this summer. There are no other records of the occurrence of this species. I have entered it on the list as hypothetical.

Shufeldt's Junco (*Junco hyemalis connectens*) is listed by Skinner as a rare migrant. I saw three near the Upper Basin July 14. I have no idea whether they were breeding or not, but they could hardly have been fall migrants. The first evidence of fall migration occurred with the flocking of the Brewer's Blackbirds on August 14.

Although there are well authenticated records for the Trumpeter Swan in the Park yet the reports of the common occurrence of this species in late fall have never been verified.

The following check-list is an attempt to present a complete list of the birds of Yellowstone Park as at present known. The latest revised A. O. U. check-lists have been used as standards for nomenclature. Most of the list is, of course, based on M. P. Skinner's "Birds of the Yellowstone", published by the Roosevelt Wild Life Experiment Station of Syracuse University. Mr. Skinner was connected with the Park for ten years previous to his appointment as Park Naturalist in 1920, which office he held until his resignation in 1922.

Several new records are included and a hypothetical list has been added. An attempt has been made to indicate the status of each species in the Park. "Possible" or "Probable" breeders indicates that as yet no breeding record has been established, but that all conditions are favorable for the breeding of that species in the Park. Breeding or nesting dates in the Park are my own observations in most cases.

Thanks are due to Dr. H. M. Kelly, Ranger Naturalist at Yellowstone Lake, and to Park Naturalist D. G. Yeager, and to head Ranger Naturalist Dr. E. N. Jones, for the privilege of visiting the Molly Islands with the Ecology Party under Dr. Lynds Jones; and especially to Mr. Newell Joyner, Assistant Park Naturalist, for much help and many valuable suggestions in the preparation of the list. Where initials are given, Sk. is for Skinner, and E. K. for my own personal observations or comments.

Additions to the check-list for the Yellowstone Park as given by Skinner in 1925 (Birds of Yellowstone National Park, Roosevelt Wild Life Bulletin, Vol. 3, No. 1, pp. 170-176) are marked with an asterisk (*).

THE LIST

WESTERN GREBE. *Aechmophorus occidentalis.* Occasional breeder.

HORNED GREBE. *Colymbus auritus.* Frequent migrant.

EARED GREBE. *Colymbus nigricollis californicus.* Common breeder. Downy young, Yellowstone Lake, July 15, 1929 (E.K.).

PIED-BILLED GREBE. *Podilymbus podiceps.* Frequent migrant, probable breeder.

LOON. *Gavia immer.* Migrant, May and November (Sk.).

*RED-THROATED LOON. *Gavia stellata.* Apparently the first record. June 28, 1929, at West Thumb. Seen first by Dorr Yeager and myself. Two young well grown on Yellowstone Lake, July 15. (E.K.)

CALIFORNIA GULL. *Larus californicus.* Common breeder. Young and eggs, Yellowstone Lake, June 29. (E.K.).

RING-BILLED GULL. *Larus delawarensis.* Frequent breeder.

BONAPARTE'S GULL. *Larus philadelphia.* Migrant.

CASPIAN TERN. *Sterna caspia imperator.* Frequent breeder. Eggs and young. June 29, Yellowstone Lake. (E.K.).

BLACK TERN. *Chlidonias nigra surinamensis.* Frequent migrant, probable summer resident.

WHITE PELICAN. *Pelecanus erythrorhynchos.* Local breeder. Young and eggs, June 29, Molly Islands, Yellowstone Lake. (E.K.).

MERGANSER. *Mergus americanus.* Common breeder, permanent resident.

*RED-BREASTED MERGANSER. *Mergus serrator.* Common migrant, probable summer resident. Several flocks seen on Yellowstone Lake, June 29. (E.K.).

HOODED MERGANSER. *Lophodytes cucullatus.* Permanent resident.

MALLARD. *Anas platyrhynchos.* Permanent resident.

GADWALL. *Chaulelasmus streperus.* Breeder.

BALDPATE. *Mareca americana.* Common breeder.

GREEN-WINGED TEAL. *Nettion carolinense.* Permanent resident.

BLUE-WINGED TEAL. *Querquedula discors.* Common breeder.

CINNAMON TEAL. *Querquedula cyanoptera.* Common breeder.

SHOVELLER. *Spatula clypeata.* Occasional breeder, frequent migrant.

PINTAIL. *Dafila acuta tzitzihoa.* Common breeder.

WOOD DUCK. *Aix sponsa.* Rare breeder.

REDHEAD. *Marila americana.* Migrant.

CANVAS-BACK. *Marila valisineria.* Migrant.

SCAUP DUCK. *Marila marila.* Common breeder. The common form in migration. Seen on Yellowstone Lake at various times during summer of 1929. (E.K.).

LESSER SCAUP. *Marila affinis.* Frequent breeder and migrant.

AMERICAN GOLDEN-EYE. *Glaucionetta clangula americana.* Winter visitor. (Sk.).

BARROW'S GOLDEN-EYE. *Glaucionetta islandica.* Common permanent resident.

BUFFLE-HEAD. *Charitonetta albeola.* Migrant.

PACIFIC HARLEQUIN DUCK. *Histrionicus histrionicus pacificus.* Rare breeder. Yellowstone Park June 16 and 29. (E.K.).

AMERICAN SCOTER. *Oidemia americana.* Migrant.

PACIFIC WHITE-WINGED SCOTER. *Oidemia deglandi dixoni.* Rare visitor.

RUDDY DUCK. *Eristmatura jamaicensis.* Occasional breeder and common migrant.

LESSER SNOW GOOSE. *Chen hyperboreus hyperboreus.* Rare migrant.

CANADA GOOSE. *Branta canadensis.* Permanent resident and common migrant. Eggs, Yellowstone Lake, Molly Islands, June 29. (E.K.).

HUTCHINS'S GOOSE. *Branta canadensis hutchinsi.* Rare migrant.

WHISTLING SWAN. *Olor columbianus.* Winter visitor and possible summer resident. Common fall migrant.

TRUMPETER SWAN. *Olor buccinator.* Rare breeder.

WHITE-FACED GLOSSY IBIS. *Plegadis guarauna.* Casual visitor. (Sk.).

*WOOD IBIS. *Mycteria americana.* A casual record of this species at the Grand Canyon on July 16, 1925, is reported by A. C. Bent ("Life Histories of North American Marsh Birds", 1926, page 65).

GREAT BLUE HERON. *Ardea herodeas traganzai.* Frequent breeder. Young, Upper Basin, July 1. Seen frequently at Upper Geyser Basin, summer of 1929. (E.K.).

*BLACK-CROWNED NIGHT HERON. *Nycticorax nycticorax naevius.* One record. (Sk.).

WHOOPING CRANE. *Grus americana.* Few pairs breeding in Bechlar River Region, Yellowstone Park. (Pearson). Adults seen by Bicknell.

LITTLE BROWN CRANE. *Grus canadensis.* Rare migrant.

SANDHILL CRANE. *Grus mexicana.* Breeder. Seen near Fountain Station frequently, summer of 1929. (E.K.).

SORA. CAROLINA RAIL. *Porzana carolina.* Occasional breeder.

AMERICAN COOT. *Fulica americana.* Occasional breeder and common migrant.

NORTHERN PHALAROPE. *Lobipes lobatus.* Rare migrant.

WILSON'S PHALAROPE. *Steganopus tricolor.* Occasional breeder.

AMERICAN AVOCET. *Recurvirostra americana.* Rare migrant.

WILSON'S SNIPE. *Gallinago delicata.* A few wintering near Mammoth. Occasional breeder.

PECTORAL SANDPIPER. *Pisobia maculata.* Rare migrant.

BAIRD'S SANDPIPER. *Pisobia bairdi.* Rare migrant.

LEAST SANDPIPER. *Pisobia minutilla.* Occasional migrant.

*MARBLED GODWIT. *Limosa fedoa.* First Yellowstone record, June 29, 1929, on Molly Islands, Yellowstone Lake. Also observed by H. C. Jones.

GREATER YELLOW-LEGS. *Totanus melanoleucus.* Occasional migrant.

LESSER YELLOW-LEGS. *Totanus flavipes.* Occasional migrant.

WESTERN SOLITARY SANDPIPER. *Tringa solitaria cinnamomea.* Occasional fall migrant.

WESTERN WILLET. *Catoptrophorus semipalmatus inornatus.* Occasional fall migrant.

SPOTTED SANDPIPER. *Actitis macularia.* Abundant summer resident. Eggs, June 20, Upper Basin. (E.K.).

LONG-BILLED CURLEW. *Numenius americanus.* Occasional migrant.

KILLDEER. *Oxyechus vociferus.* Abundant summer resident. One of earliest spring arrivals. Downy young, Upper Basin, June 26. (E. K.).

RUDDY TURNSTONE. *Arenaria interpres morinella.* Rare migrant.

RICHARDSON'S GROUSE. *Dendragapus obscurus richardsoni.* Common permanent resident.

FRANKLIN'S GROUSE. *Canachites franklini.* Very rare permanent resident.

Gray Ruffed Grouse. *Bonasa umbellus umbelloides.* Common permanent resident.

Columbian Sharp-tailed Grouse. *Pedioecetes phasianellus columbianus.* Rare permanent resident

Sage Hen. *Centrocercus urophasianus.* Rare permanent resident.

Western Mourning Dove. *Zenaidura macroura marginella.* Occasional breeder. Incubating first week in July at Yellowstone Lake. (E.K.). Seen by Joyner at Upper Basin, September 7, 1929.

Marsh Hawk. *Circus hudsonius.* Common breeder.

Sharp-shinned Hawk. *Accipiter velox.* Breeder.

Cooper's Hawk. *Accipiter cooperi.* Breeder.

Western Goshawk. *Astur atricapillus striatulus.* Rare permanent resident. More common in winter.

Western Red-tail. *Buteo borealis calurus.* Common breeder.

Swainson's Hawk. *Buteo swainsoni.* Common breeder.

Rough-legged Hawk. *Archibuteo lagopus sancti-johannis.* Occasional winter resident, very rare in Park season.

Ferruginous Rough-leg. *Archibuteo ferrugineus.* Possible permanent resident. Occasionally seen as summer visitor.

Golden Eagle. *Aquila chrysaetos.* Occasional permanent resident.

Bald Eagle. *Halieaetus leucocephalus.* Occasional permanent resident.

Prairie Falcon. *Falco mexicanus.* Rare breeder.

Duck Hawk. *Falco peregrinus anatum.* Rare breeder.

Pigeon Hawk. *Falco columbarius columbarius.* Occasional breeder. Accidental winter visitor at Mammoth, November 15, 1928. Identified by Yeager and Joyner.

Desert Sparrow Hawk. *Cerchneis sparveria phalaena.* Common breeder. Young at Upper Basin. Fledged the first week of July. (E.K.).

Osprey. Fish Hawk. *Pandion haliaetus carolinensis.* Common breeder. Young in nest, June 16, 1929. Yellowstone Canyon.

Long-eared Owl. *Asio otus wilsonianus.* Rare permanent resident.

Short-eared Owl. *Asio flammeus.* Occasional breeder and rare permanent resident.

Rocky Mountain Screech Owl. *Otus asio maxwelliae.* Rare visitor.

WESTERN HORNED OWL. *Bubo virginianus occidentalis.* Common breeder; possible permanent resident.

AMERICAN HAWK OWL. *Surnia ulula caparoch.* Possible breeder. Occasional winter resident.

ROCKY MOUNTAIN PYGMY OWL. *Glaucidium gnoma pinicola.* Occasional winter resident and probable breeder.

BELTED KINGFISHER. *Ceryle alcyon.* Common breeder; occasional permanent resident.

ROCKY MOUNTAIN HAIRY WOODPECKER. *Dryobates villosus monticola.* Permanent resident.

BATCHELDER'S WOODPECKER. *Dryobates pubescens homorus.* Permanent resident.

ARCTIC THREE-TOED WOODPECKER. *Picoides arcticus.* Rare breeder. One seen July 10, 1929, at Upper Basin carrying food. (E.K.).

ALPINE THREE-TOED WOODPECKER. *Picoides americanus dorsalis.* Rare breeder.

RED-NAPED SAPSUCKER. *Sphyrapicus varius nuchalis.* Occasional breeder.

WILLIAMSON'S SAPSUCKER. *Sphyrapicus thyroideus.* Common breeder.

RED-HEADED WOODPECKER. *Melanerpes erythrocephalus.* Rare breeder.

LEWIS'S WOODPECKER. *Asyndesmus lewisi.* Rare breeder.

RED-SHAFTED FLICKER. *Colaptes cafer collaris.* Abundant summer resident; occasional permanent resident. Mating at Upper Basin, July 1. (E.K.).

PACIFIC NIGHTHAWK. *Chordeiles virginianus hesperis.* Common breeder. Fresh eggs, Upper Basin, July 1, 1929. (E.K.).

WHITE-THROATED SWIFT. *Aeronautes melanoleucus.* Rare breeder.

BROAD-TAILED HUMMINGBIRD. *Selasphorus platycercus.* Rare breeder.

RUFOUS HUMMINGBIRD. *Selasphorus rufus.* Rare breeder. One record for Upper Basin. (Sk.).

CALLIOPE HUMMINGBIRD. *Stellula calliope.* Occasional breeder.

KINGBIRD. *Tyrannus tyrannus.* Occasional breeder, most common at the lower altitudes.

*ARKANSAS KINGBIRD. *Tyrannus verticalis.* Breeder.

Say's Phoebe. *Sayornis sayus.* Common breeder. Nest with young, Upper Basin, July 2. (E.K.).

Olive-sided Flycatcher. *Nuttalornis borealis.* Rare breeder.

Western Wood Pewee. *Myiochanes richardsoni.* Occasional breeder.

Western Flycatcher. *Empidonax difficilis.* Occasional breeder.

Traill's Flycatcher. *Empidonax trailli.* Common breeder.

Hammond's Flycatcher. *Empidonax hammondi.* Rare breeder.

Wright's Flycatcher. *Empidonax wrighti.* Common breeder.

Desert Horned Lark. *Otocoris alpestris leucolaema.* Common breeder. (Sk.).

Hoyt's Horned Lark. *Otocoris alpestris hoyti.* Rare winter visitor. (Sk.).

Black-billed Magpie. *Pica pica hudsonia.* Occasional permanent resident. Common winter resident.

Black-headed Jay. *Cyanocitta stelleri annectens.* Rare permanent resident.

Rocky Mountain Jay. *Perisoreus canadensis capitalis.* Occasional permanent resident.

American Raven. *Corvus corax sinuatus.* Common permanent resident.

Western Crow. *Corvus brachyrhynchos hesperis.* Common summer resident at lower altitudes. Rare permanent resident.

Clarke's Nutcracker. *Nucifraga columbiana.* Abundant permanent resident.

Pinion Jay. *Cyanocephalus cyanocephalus.* Rare visitor, possible breeder.

Bobolink. *Dolichronyx oryzivorus.* Occasional breeder.

Cowbird. *Molothrus ater.* Rare breeder; infrequent migrant.

Yellow-headed Blackbird. *Xanthocephalus xanthocephalus.* Occasional breeder; common migrant.

Thick-billed Red-wing. *Agelaius phoeniceus fortis.* Common migrant; occasional breeder.

Western Meadowlark. *Sturnella neglecta.* Abundant breeder.

Bullock's Oriole. *Icterus bullocki.* Rare breeder.

Brewer's Blackbird. *Euphagus cyanocephalus.* Abundant migrant; common breeder.

WESTERN EVENING GROSBEAK. *Hesperiphona vespertina montana.* Erratic wanderer, probably breeding in the higher altitudes of the Park.

ROCKY MOUNTAIN PINE GROSBEAK. *Pinicola enucleator montana.* Common migrant; occasional breeder; possible permanent resident.

CASSIN'S PURPLE FINCH. *Carpodacus cassini.* Common breeder.

AMERICAN CROSSBILL. *Loxia curvirostra minor.* Erratic visitor, probable breeder at higher altitudes.

WHITE-WINGED CROSSBILL. *Loxia leucoptera.* Rare migrant. (Sk.).

GRAY-CROWNED ROSY FINCH. *Leucosticte tephrocotis.* Common winter resident.

HEPBURN'S ROSY FINCH. *Leucosticte tephrocotis littoralis.* Common winter resident

BLACK ROSY FINCH. *Leucosticte atrata.* Occasional winter resident.

REDPOLL. *Acanthis linaria.* Occasional winter resident.

PALE GOLDFINCH. *Astragalinus tristis pallidus.* Occasional breeder. Seen several times in Upper Geyser Basin, 1929. (E.K.).

PINE SISKIN. *Spinus pinus.* Frequent breeder, possible permanent resident.

ENGLISH SPARROW. *Passer domesticus domesticus.* Rare permanent resident at Mammoth. (Sk.).

SNOW BUNTING. *Plectrophenax nivalis.* Rare winter visitor.

ALASKA LONGSPUR. *Calcarius laponicus alascensis.* Occasional winter visitor.

WESTERN VESPER SPARROW. *Pooecetes gramineus confinis.* Abundant summer resident below 7,000 feet. (Sk.). Bred at Upper Basin, summer of 1929. (E.K.).

WESTERN SAVANNAH SPARROW. *Passerculus sandwichensis alaudinus.* Common breeder.

*WESTERN GRASSHOPPER SPARROW. *Ammodramus savannarum bimaculatus.* Several pairs breeding around Upper Geyser Basin in meadows in summer of 1929. Apparently the first record for the Park. (E.K.).

WESTERN LARK SPARROW. *Chondestes grammacus strigatus.* Rare breeder.

WHITE-CROWNED SPARROW. *Zonotrichia leucophrys.* "Abundant summer resident." (Sk.).

GAMBEL'S SPARROW. *Zonotrichia leucophrys gambelli.* Occasional migrant.

WHITE-THROATED SPARROW. *Zonotrichia albicollis.* Accidental visitor.

WESTERN TREE SPARROW. *Spizella monticola ochracea.* Frequent migrant in February, March, September, and October. (Sk.). Possible winter resident.

WESTERN CHIPPING SPARROW. *Spizella passerina arizonae.* Common breeder.

BREWER'S SPARROW. *Spizella breweri.* Rare breeder.

SHUFELDT'S JUNCO. *Junco hyemalis connectens.* Rare migrant. (Sk.). Seen Upper Basin, July 14, 1929. (E.K.).

MONTANA JUNCO. *Junco hyemalis montanus.* Occasional migrant.

PINK-SIDED JUNCO. *Junco hyemalis mearnsi.* Abundant migrant, common breeder, frequent permanent resident.

MOUNTAIN SONG SPARROW. *Melospiza medodia montana.* Common breeder, occasional permanent resident.

LINCOLN'S SPARROW. *Melospiza lincolni.* Frequent breeder. (Sk.). Rarely seen because shy.

SLATE-COLORED FOX SPARROW. *Passerella iliaca schistacea.* Rare breeder.

SPURRED TOWHEE. *Pipilo maculatus montanus.* Recorded by Skinner.

GREEN-TAILED TOWHEE. *Oberholseria chlorura.* Common breeder below 6500 feet. (Sk.).

BLACK-HEADED GROSBEAK. *Hedymeles melanocephalus.* Rare spring migrant. (Sk.).

LAZULI BUNTING. *Passerina amoena.* Occasional breeder.

LARK BUNTING. *Calamospiza melanocorys.* Occasional migrant.

WESTERN TANAGER. *Piranga ludoviciana.* Abundant breeder. Young, July 15, Upper Basin. (E.K.).

CANADIAN CLIFF SWALLOW. *Petrochelidon lunifrons* (*Petrochelidon lunifrons hypopolea* proposed). Common breeder.

BARN SWALLOW. *Hirundo erythrogastra.* Rare breeder.

TREE SWALLOW. *Iridoprocne bicolor.* Common breeder. Downy young, July 10, Biscuit Basin. (Joyner).

NORTHERN VIOLET-GREEN SWALLOW. *Tachycineta thalassina lepida.* Common breeder, locally.

BANK SWALLOW. *Riparia riparia.* Common breeder locally.

ROUGH-WINGED SWALLOW. *Stelgidopteryx serripennis.* Rare breeder.

BOHEMIAN WAXWING. *Bombycilla garrula.* Erratic visitor.

*CEDAR WAXWING. *Bombycilla cedrorum.* Rare migrant.

NORTHERN SHRIKE. *Lanius borealis.* Occasional migrant. Observed Upper Basin, September 3, 1929. (E. K.).

WHITE-RUMPED SHRIKE. *Lanius ludovicianus excubitorides.* Rare summer resident. (Sk.).

WESTERN WARBLING VIREO. *Vireosylvia gilva swainsoni.* Common breeder.

CALAVERAS WARBLER. *Vermivora ruficapilla gutturalis.* One record. Stygian Caves (near Mammoth), Dr. Palmer, 1907.

ORANGE-CROWNED WARBLER. *Vermivora celata.* Rare breeder, lower Gardiner River.

WESTERN YELLOW WARBLER. *Dendroica aestiva* (*Dendroica aestiva marconi*, proposed subspecies). Occasional summer resident.

HOOVER'S WARBLER. *Dendroica coronata hooveri.* Rare migrant.

AUDUBON'S WARBLER. *Dendroica auduboni.* Abundant breeder.

TOWNSEND'S WARBLER. *Dendroica townsendi.* Occasional breeder near Mammoth. (S.K.).

MACGILLIVRAY'S WARBLER. *Oporonis tolmiei.* Rare breeder.

WESTERN YELLOW-THROAT. *Geothlypis trichas occidentalis.* Common breeder at low altitudes.

PILEOLATED WARBLER. *Wilsonia pusilla pileolata.* Common breeder.

PIPIT. *Anthus rubescens.* Common breeder on high bare ridges. (Sk.).

*SPRAGUE'S PIPIT. *Anthus spraguei.* Lower Geyser Basin, July 10, 1929. (E.K.). Apparent first record.

DIPPER. *Cinclus mexicanus unicolor.* Common permanent resident.

SAGE THRASHER. *Oreoscoptes montanus.* Rare breeder.

CATBIRD. *Dumetella carolinensis.* Rare breeder, below 6000 feet. (Sk.).

ROCK WREN. *Salpinctes obsoletus.* Common breeder in Northern sections of the Park. (Sk.). Several pairs near Fountain Station, summer of 1929. (E.K.).

WESTERN HOUSE WREN. *Troglodytes aedon parkmani.* Occasional breeder at Mammoth. (Sk.).

WESTERN MARSH WREN. *Telmatodytes palustris plesius.* Rare breeder near Tower Falls. (Sk.).

ROCKY MOUNTAIN CREEPER. *Certhia familiaris montana.* Occasional permanent resident.

ROCKY MOUNTAIN NUTHATCH. *Sitta carolinensis nelsoni.* Occasional permanent resident.

RED-BREASTED NUTHATCH. *Sitta canadensis.* Common permanent resident.

PYGMY NUTHATCH. *Sitta pygmacea.* Rare visitor.

LONG-TAILED CHICKADEE. *Penthestes atricapillus septentrionalis.* Occasional permanent resident.

MOUNTAIN CHICKADEE. *Penthestes gambeli.* Abundant permanent resident.

WESTERN GOLDEN-CROWNED KINGLET. *Regulus satrapa olivaceus.* Rare breeder.

RUBY-CROWNED KINGLET. *Regulus calendula.* Common breeder.

TOWNSEND'S SOLITAIRE. *Myadestes townsendi.* Common breeder, occasional permanent resident. (Sk.).

WILLOW THRUSH. *Hylocichla fuscescens salicicola.* Rare breeder. lowest altitudes. (Sk.).

OLIVE-BACKED THRUSH. *Hylocichla ustulata swainsoni.* Occasional breeder in northern part. (Sk.).

AUDUBON'S HERMIT THRUSH. *Hylocichla guttata auduboni.* "Uncommon" breeder. (Sk.). Common breeder, Upper Basin and Mammoth. (E.K.). (At least ten breeding pairs found summer of 1929).

WESTERN ROBIN. *Planesticus migratorius propinquus.* Common breeder, possible occasional permanent resident near Mammoth. Eggs, June 20, 1929, Upper Basin. (E.K.).

WESTERN BLUEBIRD. *Sialia mexicana occidentalis.* Occasional breeder.

MOUNTAIN BLUEBIRD. *Sialia currucoides.* Abundant breeder. Nest and eggs, Upper Basin, July 2, 1929. (E.K.).

OBERLIN, OHIO.

THE WILSON BULLETIN

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The present editorial organization is as follows: T. C. Stephens, Editor-in-Chief, Sioux City, Iowa; Myron H. Swenk, University of Nebraska, Lincoln, Nebraska; Albert F. Ganier, Nashville, Tennessee; Alfred M. Bailey, Chicago Academy of Sciences, Chicago, Illinois; R. D. Hissong, Sioux City, Iowa.

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EDITORIAL

Mr. Joseph Parker Norris, Jr., 816 City Center Building, Philadelphia, Pa., desires to obtain the following back numbers of the WILSON BULLETIN: Volume XI, No. 6, Whole Number 29; XIII, No. 3, W. N. 36; XVI, No. 1, W. N. 46; XX, No. 4, W. N. 63; and the following numbers in the original (not reprints): volume VI, Nos. 1, 2, 3, 4, 5; VII, Nos. 6, 7, 8; XI, No. 1, W. N. 24; XI, No. 5, W. N. 28.

FROM THE DIFFERENT OFFICERS we learn that at the present time we have 783 paid-up members. There are about 87 members delinquent in dues for the current year; and while we have been compelled to discontinue the BULLETIN to these delinquent members, we are hoping that many of them will be reinstated. There are 72 paying subscribers. During the current year we have received approximately 190 new members, and these have come chiefly through the systematic efforts of Secretary Shaver and his committee. We are all anxious to exceed the 200 mark for the year, and the 800 mark in total membership—and there is little doubt of this success. Those who are interested in helping may do so by sending to Secretary Shaver the names of prospective members.

Post script. Before going to press we learn that our total paid-up membership is now 802, with 74 paying subscribers.

THE ANNUAL MEETING AT CLEVELAND

As is its custom when the American Association for the Advancement of Science meets in its territory, the Wilson Ornithological Club will meet at the same time as the larger organization—this year at Cleveland, Ohio. Although the American Association and affiliated societies will meet during the entire week from December 29 through January 3, the Wilson Ornithological Club will hold its meetings on the first two days of this week, on Monday and Tuesday, December 29-30, 1930. It is expected that both days will be given to the formal programs, with one evening doubtless for the annual dinner.

The Secretary is already at work on the program for this meeting. He is very anxious that all members who have new and interesting material should present it at this meeting. Send to him early the title of your paper or talk, with a careful estimate of the time needed to deliver it, and make clear whether you will wish to use a projection lantern for lantern slides, standard size, or small size movie film. The usual announcements concerning headquarters, etc., will be made later.

Special Railroad Rates

Special railroad rates should make it possible for many members, especially in adjoining states, to attend this meeting. These rates will be on the certificate plan, and apply to all societies affiliated or associated with the A. A. A. S. Since the Wilson Ornithological Club is an associated organization, these rates are available to our members. To secure these rates, purchase a one-way ticket to Cleveland and at the same time secure from the ticket agent a convention certificate to the American Association for the Advancement of Science meeting. Do not purchase the ticket without also getting this certificate, and apply for it long enough in advance of train time to allow the agent sufficient time. The certificate must be validated by the proper convention officials at Cleveland, and will then entitle the member to purchase his return ticket at half fare.

GENERAL NOTES

Conducted by M. H. Swenk

The Pine Grosbeak in South Dakota.—During November of 1929, I saw a Pine Grosbeak (*Pinicola enucleator*) in company with three Robins in the vicinity of Lake Poinsett, Brookings County, South Dakota. This is a rare bird in this state in my experience.—ADRIAN LARSON, *Arlington, S. D.*

A Burrowing Owl Record for Hancock County, Illinois.—On April 9, 1930, Mr. Marvin Fenton of Hamilton, Illinois, brought to the writer a specimen of Burrowing Owl (*Speotyto cunicularia hypogaea*) to be mounted for the museum of Carthage College. Mr. Fenton secured this bird, a male, in the lowlands between Hamilton and Warsaw, Illinois. He did not succeed in locating the female, if one were present.—EARL L. LAMBERT, *Carthage, Ill.*

Lesser Snow Geese at Fox Lake, Wisconsin.—A flock of Lesser Snow Geese (*Chen hyperboreus hyperboreus*), conservatively estimated to number 500, spent about two weeks at Fox Lake (Dodge County) in November, 1929. They rested on the lake and fed on the Prison Farm about three miles distant. On November 14, Mr. G. L. Wedge, of Fox Lake, shot at the geese while they were feeding at the farm. Though none fell, he knew that some had been hit. The birds returned to the lake, where two that were afflicted with body wounds were taken by him. Another bird was killed on November 15, 1929.—A. W. SCHORGER, *Madison, Wis.*

The Starling in Northern Louisiana.—A flock of about 100 Starlings (*Sturnus vulgaris*) appeared near Monroe, Louisiana, on January 23, 1930. A specimen was collected to verify the identification. This is the first occurrence in the state, as far as I can learn. The same flock was seen regularly for about two weeks. Smaller flocks were observed at widely distributed points throughout March, these dwindling in number until the last individual was seen, on April 6. —GEORGE LOWERY, JR., *West Monroe, La.*

Nesting of the Starling in Hancock County, Illinois.—What appear to be the first records of the nesting of the Starling (*Sturnus vulgaris*) in this region, as far as the writer can ascertain, have recently been reported. The children of Rev. Paul Buelow, who lives one-fourth of a mile north of the city limits of Carthage, on Scofield Street, found a nest of Starlings in a hollow cross-beam in their barn, on May 7, 1930. At that time definitive feathers were appearing. I went to see the nest, which contained, as nearly as I could ascertain, four young Starlings. The adult birds were carrying food from an adjacent orchard. They were very shy and difficult to approach.

Mr. Charles Rice, whose home is located midway between Dallas City and LaHarpe, in the northern part of the County, reports a nest of Starlings in an old water storage tank on a windmill on their farm.—EARL L. LAMBERT, *Carthage, Ill.*

A Flicker Migration in Iowa.—On October 2, 1927, the writer witnessed a migration flight of the common Northern Flicker (*Colaptes auratus luteus*). The birds were first noticed about 4 P. M., and were flying in a general southeast direction. They flew well above the tree tops and at a very steady pace. One bird would not be out of sight before another one would come flying over. Once in a while a bird would seem to lose sight of his companions and circle

around once or twice before starting out in the right direction. On only one occasion did I notice two birds flying at all close together. This flight lasted for some time, and over one hundred Flickers passed overhead during the period of observation.—WILLIAM YOUNGWORTH, *Sioux City, Iowa.*

Brewer's Blackbird Nesting in Illinois.—On June 17, 1929, the nest of a Brewer's Blackbird (*Euphagus cyanocephalus*) was found by a nurseryman, who pointed it out to C. E. Holcombe of Zion, Illinois. Mr. Holcombe watched the nest, and on June 26 called me to assist in the identification of the bird. On arriving at Winthrop Harbor, about half way from the railroad to Lake Michigan on the main road to the beach, and about 300 feet south of the road, we first observed there were four adult birds, so we waited until we found where the females were feeding, and in this way located the second nest. The original nest had five fully grown young in it, and the second one, which I discovered, had three slightly smaller birds and one dead bird in the nest. All eight were banded. This I believe is the first record of the Brewer's Blackbird nesting and being banded in the state of Illinois. C. E. Holcombe and Wm. Farrar of Zion, banded a nest of five and a nest of three young birds on June 28, 1930, on the "Flats" near Twenty-second Street, Zion, Illinois.—W. I. LYON, *Waukegan, Ill.*

[EDITOR'S NOTE. We find in a recent *Oologist* (XLVII, June, 1930, page 72) a note concerning the breeding of Brewer's Blackbird near Delavan, Wisconsin, in 1928. Mr. A. J. Franzen, of the Field Museum, also made a trip to the same locality on May 19, 1929, finding a colony of eleven Brewer's Blackbirds. He collected three specimens, and remarks, "I am convinced that the new invaders are Brewers".]

An Unusual Number of Wintering Birds at Hillsboro, Ohio.—The open winter of 1928-29 accounts for the increased number of birds here mentioned:

Mourning Dove (*Zenaidura macroura carolinensis*). Very abundant where grain is fed.

Red-headed Woodpecker. (*Melanerpes erythrocephalus*). More than the usual number have remained as residents.

Rusty Blackbird (*Euphagus carolinus*). Three arrived November 15 and in a few days the number was increased to seven, and on December 31 to thirty. They feed on frozen apples.

Blue Jay (*Cyanocitta cristata cristata*). Very abundant this fall and winter. Usually about the same throughout the year.

Golden-crowned Kinglet (*Regulus satrapa satrapa*). A rather common and general winter resident.

Robin (*Planesticus migratorius migratorius*) and Bluebird (*Sialia sialis sialis*). Unusually common. (Males).—KATIE M. ROADS, *Hillsboro, Ohio.*

Additions to the Easter Birds of Little Egypt.—In the WILSON BULLETIN for March, 1929, Mr. A. Sidney Hyde and I published a list of 112 species of birds found during the Easter period in southern Illinois. Since this survey was made, in 1927, I have made two more trips through the region under consideration during the same period of the year, and it is considered advisable to add to the published list the twenty-one additional records made during 1928 and 1930. In order to correlate these with the records of the previous paper, the species are listed here in reference to the associations in which they were found·

1, upland oak-hickory; 1a, bushy clearings in oak-hickory. 2, cypress swamp; 3, open fields; 4, aquatic; 5, general or local situations.

Water-turkey (*Anhinga anhinga*)	2
Double-crested Cormorant (*Phalacrocorax auritus auritus*)	4
Red-breasted Merganser (*Mergus serrator*)	4
Mallard (*Anas platyrhyncha platyrhyncha*)	4
Blue-winged Teal (*Querquedula discors*)	4
Shoveller (*Spatula clypeata*)	4
Canada Goose (*Branta canadensis canadensis*)	4
Bittern (*Botaurus lentiginosus*)	3
Black-crowned Night Heron (*Nycticorax nycticorax naevius*)	3
King Rail (*Rallus elegans*)	2, 4
Coot (*Fulica americana americana*)	4
Wilson's Snipe (*Capella gallinago delicata*)	2, 4
Sharp-shinned Hawk (*Accipiter velox*)	1
Rough-legged Hawk (*Archibuteo lagopus sancti-johannis*)	1
Henslow's Sparrow (*Passerherbulus henslowi henslowi*)	3
Lincoln's Sparrow (*Melospiza lincolni lincolni*)	3
Tennessee Warbler (*Vermivora peregrina*)	1
Sycamore Warbler (*Dendroica dominica albilora*)	2
Ovenbird (*Seiurus aurocapillus*)	1a, 1
Canada Warbler (*Wilsonia canadensis*)	1, 3
Chickadee (*Penthestes atricapillus atricapillus*)	1, 3

--ALVIN R. CAHN, *University of Illinois, Urbana, Ill.*

Migration Records from North Dakota.--I have recently compiled my notes on migration at Fargo. These cover a period of twenty years, but are not very extensive, especially for the first ten years. For the last ten years they have been more systematic, and since 1925 more thorough within a certain range, on account of trapping operations (see *Bird Banding*, I, pp. 67-69). Spring arrival dates are at hand for some sixty species for five or more years. It is interesting to note that the addition of the last six years has not changed the average date materially in most cases.

Compared with the records of Norman Criddle at Aweme, Manitoba (*Auk*, XXXIX, pp. 41-49), the dates at Fargo are quite uniformly four or five days earlier until about April 20. After that date the difference is small and more often is earlier at Aweme. Small differences would no doubt be expected at that time of the year, and careful study would be needed to show whether they are significant or are the result of the relative closeness of observation or of abundance of birds. Some outstanding differences in the first group are the Robin, Bronzed Grackle, Ruby-crowned Kinglet, and Chipping Sparrow which are 10, 10, 11, and 13 days earlier, respectively, at Fargo.

The common Kingbird (*Tyrannus tyrannus*) is such a familiar bird that observational errors can hardly enter into the case. The records for this species show such a marked peculiarity that I thought it worth while to question whether others have made similar observations. The average date of arrival to 1923, inclusive, was May 17 (ten years' record), the latest being May 21, in 1910. In 1924 the date was May 30, since when it has been May 22, 23, 22, 24, 21 (new average, May 19). It seems only natural to suggest that the birds suffered a marked reduction in 1924 and have been less abundant since. I believe such to be the case, but have no data.—O. A. STEVENS, *Fargo, N. Dak.*

Notes on the Nesting Habits of Bluebirds.—During the summer of 1927 I had a pair of Bluebirds nest in a bird house I had put up on a grape-vine

post. On July 4, I banded this pair of Bluebirds and two of their young, which had been out of the nest a few days—519405 female, 519402 male, 519403 juvenile, 519404 juvenile.

In the spring of 1928 the female came back with a different male and nested in the same bird house. I banded this male April 11, 608791 male; and on June 6 I banded their four young after they left the nest, 665171, 665172, 665173, 665174. This pair nested again in the same house, but I did not get any of the second hatching of 1928.

Then, in the spring of 1929 the female returned here, bringing the third male I have recorded with her. They took a different house this year, a section of hollow apple tree I had put up during the winter. They were feeding their young the middle of May. On May 20 I trapped the adult birds by putting several "June-bugs" or brown beetles in a trap. Both birds immediately entered the trap and I banded the male which I called "Reno the Third", A134069 male. I banded this male at the photographer's where I had some pictures taken of the pair. They were not frightened nor very nervous. They took their young away unobserved about May 24, and I did not see them again until the morning of June 5, when they were back here feeding four young. I could not get the young that day, but the next day, the 6th, I banded two of the young, and the other two the 7th, the parent birds still feeding the young these two days, and the female starting to rebuild the nest. I noticed afterward it was also on June 6 when I banded her young in 1928.

The morning of June 8 the young were mostly feeding themselves, the mother bird being busy building the nest. About the end of May, when the birds were away, I had taken the top off the house and hinged it on and fastened it with a hook and eye so that I could keep the nest under observation. I was surprised and greatly pleased on the evening of the 6th, when I went to see a friend three-quarters of a mile southeast of here, for there was my whole family of Bluebirds ahead of me, some of the young with bands, some without. I do not know where they roosted, but they were all back here early in the morning.

June 10. The Bluebirds continue to feed here during the forenoons. One egg in the new nest this day.

June 11. Two eggs in the nest.

June 12. I did not get to look in the nest.

June 13. A. M. I carefully opened the top of the house and looked in. The female was on the nest within ten inches of my face.

June 15. I saw the female Bluebird feeding away from the nest, so I looked in and there were five eggs, the last one probably laid on the 14th.

June 26. I looked in at the Bluebird sitting on the nest.

June 27. 6 P. M. I saw the female in the apple tree, so I got the ladder and and carefully looked in the nest and saw four newly hatched birds, tiny little brown things with a little dark fuzz on them, one egg still in the nest.

June 29. In the evening I looked in the nest and the egg was still there so I carefully removed it. It had no sign of a bird in it.

July 2. P. M. Saw the adult birds on the telephone wires in the alley, and looked in at the four little ones which were growing nicely.

July 10. P. M. I banded the four young birds at the nest at about fifteen days old. The old birds did not make much fuss when I handled the little ones.

July 12. I looked in at the young and they were all right. The parent birds both flew at me for intruding.

July 14. A. M. I looked in the bird house and found it empty. They must have taken the young away on the 13th at about seventeen days old and close to thirty-three days after the first egg was laid.—C. E. HOLCOMBE, *Zion, Ill.*

The Evening Grosbeak Nesting in Northern Michigan.—On June 19, 1930, in the northern peninsula of Michigan, in eastern Baraga County, immediately upon the Marquette County line, I found a pair of Evening Grosbeaks (*Hesperiphona vespertina vespertina*) engaged in nest-building. The location is upon a wide sandy plain, a glacial moraine, elevated some 800 or 900 feet above the level of Lake Superior, and ten miles inland from the lake shore. The plain is covered with an open forest of jack pine; the ground is carpeted with grass, with interrupting wide patches of reindeer lichen; the trees are mature, widely spreading, shaggy, and gray with *Usnea* lichen. The aspect of the place is singularly park-like.

In the course of a morning's excursion, and within range of half a mile, I had come upon two or three pairs of Evening Grosbeaks, which by their loud and somewhat shrill call-notes had manifested anxiety; but in each instance, as I began to look about me, the birds had taken wing and flown high and far, beyond sight and sound. Suspicion was, however, so far aroused that in the afternoon I returned; and I then found one of the pairs in the precise spot where I had found it in the morning, and the birds behaved in precisely the same manner—calling anxiously, and, presently, flying away. A long and careful search of the neighboring trees was made in vain, and I was about to give up and return to camp, when I heard again the call-notes. At once I seated myself and waited, and presently the birds reappeared, the male first. As the female followed and perched near, the male made a beautiful display. He crouched low, puffed out his plumage, extended his wings horizontally and set them quivering. The gorgeous contrast of the glossy black wings with the golden body suggested the appearance of a bird of paradise. There was no song; it was about half past five in the afternoon, and the sun was still high.

The female, with no manifest response, presently flew to another tree, and began to move about within its shadows. Through my field glasses I could see that she was engaged in grasping slender dry twigs with her beak and breaking them off. When she had gathered two or three of these she flew to yet another tree, and, after some hopping about, came to the site of her nest and there deposited and arranged the material. I remained watching her while she made repeated trips, and saw her gather material in the nesting tree, as well as in others. I was seated at a distance of fifty or sixty yards and was not concealed; nevertheless, the birds seemed now to pay no attention to me—perhaps because I was still. Having seen all that I could hope at the time to see, and being far from camp, I waited no longer but made such examination of the nest as was possible from the ground beneath, and then went happily on my way.

The nesting tree was a jack pine standing alone, about sixty feet high and with wide-spreading branches. At its base the trunk may have been eight inches

in diameter. The nest was placed on a lateral, eastward-extending, and slightly drooping bough, about six feet from the base of the bough and ten or twelve feet from its tip. It was, I judged, twenty or twenty-five feet from the ground. Twigs and gray cones and *Usnea* lichen screened the nest well from beneath, but apparently little more than a beginning of the building had been made.

A good deal of data has of late years been accumulating (*Auk*, XL, p. 337, April, 1923; XLI, p. 159, January, 1924; WILSON BULLETIN, XXXVII, p. 213, December, 1925; XXXIX, p. 40, March, 1927), to indicate that the species breeds in Michigan; but, as far as I have been able to discover, direct evidence of that fact has not hitherto appeared.

The sandy plain upon which the Evening Grosbeak's nest was found is notable for the presence of other birds of northern association, including the Canada Spruce Partridge, the Arctic Three-toed Woodpecker, the Canada Jay, the Tennessee Warbler, and the Hudsonian Chickadee (WILSON BULLETIN, XLI, p. 42, March, 1929).—BAYARD H. CHRISTY, *Sewickley, Pa.*

Some Random Bird Notes from Florida.—On April 21, 1927, Mr. William L. Dawson and I went to Mosquito Inlet at Ponce Park, Volusia County, Florida, to photograph shore birds. We were extremely fortunate, and found an immense flock of migrating Caspian Terns which must have numbered from 1,500 to 2,000 birds, and secured some wonderful flight pictures, enmass. There were about 150 adult Black Skimmers, hundreds of Herring Gulls, a few Laughing and Ring-billed Gulls, several Black Terns, Common and Least Terns, and about 200 Brown Pelicans. Besides these there were Turnstones, Red-backed Sandpipers, Sanderlings, Black-bellied and Semipalmated, Piping, and Wilson's Plovers. All were mingled together and we estimated that there must have been about 4,000 birds in all. A more thrilling and interesting sight we had never seen. The birds were resting, and not feeding, on the sandy tidal flats, in the mouth of the inlet. Very few notes were uttered by any of the birds. They were unusually silent for such a large number of birds.

Black Terns in immature plumage were seen in a small colony of Least Terns at Titusville, Brevard County, Florida, on June 26, 1927. Six of the birds were seen resting at the edge of water on a sand-bar in the Indian River. On July 1, 1927, at this same place, I saw one Black Tern in the adult plumage and six or seven in the immature plumage. The birds were comparatively tame, and flew from one place to another among the nesting Least Terns. Again passing by this place on July 27, I saw seven or eight adult and immature birds of this species still there. These, of course, were migrating birds.

While at Merritt's Island, on April 30, 1927, I saw five or six Bonaparte's Gulls sitting on the railing of the bridge that crosses the Indian River at Titusville and connects with Merritt's Island. They were within a few yards of the Island, and quite tame, permitting themselves to be approached to within about twenty feet, and I photographed them from the car. On May 12, two of these birds still remained, and were found at the same place and both birds were photographed together, close enough to show the conspicuous black mark on the side of the head. They were in the winter plumage.

On Merritt's Island, opposite Titusville, Brevard County, Florida, I saw a male and a female Lesser Scaup Duck swimming in a salt water pond near the Indian River, on June 27, 1926. Thinking that they might be crippled birds,

I shouted, and both rose and flew away, disproving this supposition. Lesser Scaup Ducks can be seen in abundance on the fresh and salt water until the last week in April, throughout central Florida, and a few can be seen during the month of May.

Mr. Charles E. Doe and I were camped in an oak thicket just south of Bassenger, Florida, between January 17 and January 22, 1927. Two Whip-poor-wills were calling each night while we were there. Another bird was heard calling just before day-break, on March 6, 1927, just west of Malabar, Brevard County, Florida. Mr. William L. Dawson was with me at the time. These birds are far from being a common winter resident, and few are heard.

A Sora Rail was seen feeding around the edges of a salt water pond, back several hundred yards from the Indian River, on Merritt's Island, on May 2, 1926. Its black throat was plainly visible through the binoculars. I was in company with William L. Dawson at the time. I have never found a nest of this species in Florida, nor have I ever heard its mating call, and I have been in the Florida marshes every season for years. If it breeds here it must be very local, or else I should have seen it.—Donald J. Nicholson, *Orlando, Fla.*

Experiences with Song Sparrows in 1929.—Song Sparrow No. 1 returned March 9, 1929, to the same place in which he had nested in 1928, next to our house in Columbus, Ohio. The next day he won this territory from Song Sparrow No. 4, who, since February 25, had been appropriating twice his proper share of land. From March 12 to 15 No. 1 sang a great deal, but on the 15th a mate arrived and he stopped singing almost entirely until April 11, when incubation began. All the Song Sparrows in the region did likewise, singing with much enthusiasm to warn other males from their homesteads and to invite mates, but becoming comparatively silent upon the arrival of the mates. Females announce their sex by a high-pitched, nasal "*eeeee*". One of the main duties of the male is to protect his land from intruders and in this his mate assists. All migrant Song Sparrows were driven off, and nearly all other species smaller than a Robin. There were also constant quarrels over the boundary between No. 1 and No. 4.

From March 21 to April 4, No. 1 and his mate indulged in a kind of "building play", each gathering nesting material and carrying it to many different spots. On April 6 the female began building in earnest and the male took no further part. Incubation starts with the second or third egg, and is performed by the female alone. The male sings a great deal during incubation, stationing himself fairly near the nest. When he considers it time for his mate to leave the nest he comes very near, perhaps within two yards, and gives an especially loud song, perhaps as a signal that all is well and that he is ready to guard the nest. She did not always come off at his suggestion, and he never guarded during the whole time of her absence. During the first incubation thirty-six periods on the nest of No. 1's mate averaged 34 minutes; forty-six periods off averaged 8 minutes. Two months later twenty-four periods on the nest averaged 29.4 minutes, and thirty periods off 8.7. The last incubation of No. 4's mate came at almost the same time as that of No. 1's mate, but twenty-four of her periods on the nest averaged only 21.4 minutes, while twenty-nine periods off averaged 7.9 minutes.

The males of both pairs did the major part of the feeding of the young, both in the nest and out of it. Singing again dropped to a low point. From

two to six days after the young left the nest, the two females began building for the next brood, meanwhile feeding the young to some extent, but soon leaving them to their fathers, who cared for them almost up to the day the next brood hatched.

It takes seven and one-half weeks for the complete cycle, from courtship to the weaning of the young, but due to this overlapping of cycles, No. 1 and his mate raised three broods to independence in three and one-half months. The number of days consumed in the various stages follows: Preliminary or courtship (except the first, which lasted three weeks) 4-5; building 3-4; laying 3-5; incubation 12; care of young in the nest 10-11; care of young out of the nest 16-18.

Each of the two pairs studied made four attempts at nesting. No. 1 and his mate raised three broods—a total of nine young; No. 4 and his mate raised two broods, amounting to five young.

On September 1 the females and young had left the region, but the four males that had nested near by were here, molting. No. 6 was heard singing October 4, No. 5 sang a little from October 10 to 15, and No. 1 a little from September 28 to October 13. He left for the south on the night of October 14. No. 4 was heard to sing once on September 8; beginning September 24, he sang more and more, reaching a maximum between October 7 and 13. After this he sang less and less until November 17, since when he has not been heard, although he is still on our grounds at the date of writing—December 20, 1929.—Margaret M. Nice, *Columbus, Ohio.*

Albino Hawk at Nashville

Albinism in the Red-tailed Hawk.—A perfect albino Red-tailed Hawk (*Buteo borealis borealis*) was caught in a trap set for fur-bearing animals in Lewis County, Tennessee, fifteen miles from Hohenwald on the Buffalo River, on January 10, 1930, by Mr. Russell Fite. Later it was brought to Nashville, Tennessee, and presented to me. I tried to save its life, planning to band and release it. It had, however, been kept so long without food before being brought to Nashville, and ate so heavily when food was offered it, that it died soon after. It was mounted by an expert taxidermist for Dr. H. Van Coles of Nashville, who now has it in his possession. The bird is pure white on all parts of its body, with no pigment anywhere.—Herbert C. Sanborn, *Vanderbilt University, Nashville, Tenn.*

The Matings of the Brown Thrasher.—I have just re-read E. A. Andrews' "Birds' Nests at Home" in the *Auk* for April, 1925, and have found it just as interesting as when I first read it. I believe his experiences might have been even more interesting had he banded pairs of birds to report on, to know what percentage of his nests from year to year were built by one or both adults of previous clutches or of previous years.

I have followed around several pairs of Brown Thrashers in Riverside Park at Indianapolis, the activities of which may be of interest. On July 13, 1925, I found the nest of a pair of Brown Thrashers with one fledgling therein, close to the bank of the lagoon in the park, in a vine-covered bush about five feet up. I banded the youngster, placed it under a drop trap near the nest, and, with several friends, sat on a slight elevation fifty feet away while one after the other the parent birds went to feed the fledgling and were trapped. The fledgling was given government band No. 357001, the parents, Nos. 357021 and 357022.

In 1926, on the 13th day of May, I found another thrasher nest one hundred feet or so south of the 1925 nest, a little closer to the water, about three feet up in a vine clump. Four fledglings were banded here (Nos. 357921-925-926-927). One of the adults when trapped was found to be No. 357022. The mate was a new bird, then given band No. 357932. This banding party took place May 19th.

While I had several other nests of thrashers in the neighborhood, it was not until July 14 that I found one of the adults of this family again. On an island in the lagoon, not more than 300 feet away from either of the previous nests, two half-grown fledglings were looking over the edge of this nest, which was placed in the center of a large bush. When the parents were trapped No. 357932 was found to have abandoned her mate of May 19, and was then mated to a new bird, that day banded No. 467866. Four days later No. 357022 was found brooding a single fledgling at a nest built in a small sapling around which a vine was climbing, 500 feet south of the May 19 nest. I was unable to trap the mate of this bird but it was an unbanded one. The fledgling was given No. 339259.

So we have here a case of a pair of birds changing mates two months after they had raised a brood together, under conditions which proved that it was not the seeking of a new mate after the death of the previous one.

We have had four other pairs of Brown Thrashers in the same area under observation, where only one of each pair was a banded bird.

The inference seems irresistible that after each brood is raised there is a complete shuffling of mates among the Brown Thrashers.—Samuel Elliott Perkins III, *Indianapolis, Ind.*

BIRD PHOTOGRAPHY

Conducted by Alfred M. Bailey

Springtime, summer, fall, and winter have their attractions for the nature lover, and the bird photographer who confines his efforts to the vicinity of his home will have many opportunities for excellent pictures. It is not necessary to travel far afield, for there are interesting subjects always at hand—the migrants of early spring, the nesting birds of early summer, the young and adults of early fall, and the stragglers from the north in mid-winter. The nesting season is the best time, of course, for then the adult birds take kindly to a blind; they return to their nests to feed the young without fear of the blind or the clicking camera, and the photographer may work on a single family until the young leave the nest.

Many interesting hours may be spent in a blind, and many valuable life history notes secured. It is surprising how little is known about the family life of many of our birds, as a brief inspection of the literature on a given species will show. The food habits are well worked out for the majority of common birds, but the number of feedings a day, quantities of food consumed, aggressiveness of the young in securing food—and even the incubation period are subjects worth studying.

The best photographs will be made by the one working near home, where the "victim" may be observed and photographed at all favorable opportunities. The casual visitor on an "expedition" can not hope to compete with the one working in his own "backyard"; he can secure the high lights and make interesting photographic records, to be sure, but he will be unable to make the valuable notes and life history photographs that will be secured by the one who lives in the vicinity. I know this is true, from my own experience, for I have been a hit-and-miss camera shooter for a long time, having made pictures in many parts of the country—but not until I tried working in my own neighborhood did I appreciate the difference between studying a pair of birds and working with them from the time the eggs were laid until the young left the nest, and the hurried work I had done on various field trips. I not only found that the opportunities for photography were endless, but that I had the time to learn something about the habits of the species under observation. It is with regret that I view my work of the past fifteen years—the realization of the number of birds which I have seen through the ground glass, and photographed, and then passed by without learning anything worth while.

Last year I worked with the motion picture camera on birds which nested within six miles of my house. It was real backyard photography, for I could reach the blinds in a short time. Daily visits were made to such species as the Red-shouldered Hawk, King Rail, Least Bittern, Upland and Piping Plovers; and interesting notes and photographs were made. Even a Robin in a neighbor's grape arbor was available for study, and after the season's work, I was amazed at the number of photographs secured. I then realized the abundance of camera material available for any bird photographer, for, if I could secure material to photograph within a metropolitan district of over three million people, others more fortunately situated must have greater opportunities. And—I must hasten to add, the results I obtained leave much to be desired, and another season's work upon the species would be well spent.—Alfred M. Bailey, *Chicago Academy of Sciences.*

Photographs of the Robin by Alfred M. Bailey.

PROCEEDINGS

The 1930 Joint Meeting of the N. O. U. and I. O. U. at Omaha.

The Nebraska Ornithologists' Union and the Iowa Ornithologists' Union held a joint meeting at Omaha, Nebraska, on May 16 and 17. A similar joint meeting had been held last year on the Iowa side of the Missouri River at Sioux City. Registration of members and guests began at eight o'clock on Friday morning at the Castle Hotel, and showed a total attendance of ninety-two, nineteen being from Iowa, the remainder from Nebraska.

All sessions were held at the Castle Hotel, as has been the custom for years whenever the meeting has been in Omaha. During the three sessions of Friday the following papers were presented as the scientific program:

1. Opening remarks. By Rev. Lawrence Plank, Omaha.
2. Nebraska's "Jack Miner". By Mrs. A. H. Jones, Hastings, Nebr.
3. Bird songs in musical notation. By Mrs. Lily R. Button, Fremont, Nebr.
4. Birds seen on a summer's trip through Europe. By Mrs. Mary L. Bailey, Sioux City. (Read by Mrs. T. C. Stephens).
5. Progress and tendencies in ornithology. By Dr. W. B. Bell, United States Bureau of Biological Survey, Washington, D. C.
6. Birds in poetry. By Mrs. A. J. Palas, Des Moines.
7. Waterfowl at Carter Lake, near Omaha. By Robert Overing, Omaha.
8. Where tragedy stalks in birdland. By W. M. Rosene, Ogden, Iowa.
9. A successful failure. By W. W. Bennett, Sioux City.
10. Instinct and reason in birds. By Rev. J. M. Bates, Red Cloud, Nebr.
11. Conservation of wild flowers. By Victor Overman, Omaha.
12. Natural advantages of Nebraska as a State for birds. By Dr. R. H. Wolcott, Lincoln.
13. Nebraska's bird life as found by the early naturalists. By Mrs. Addison E. Sheldon, Lincoln.
14. The Mourning Dove situation in Nebraska. By Mrs. Florence Steunenberg, Omaha.
15. Can the Prairie Chicken be saved? By A. M. Brooking, Hastings, Nebr.
16. Proper conservation of our birds of prey. By Prof. M. H. Swenk, Lincoln.
17. Eastern Nebraska forests as bird sanctuaries. By Roy N. Towl, Omaha.

On Saturday, May 17, approximately a hundred people participated in the annual field trips. Several parties visited the different localities of ornithological interest, returning to Camp Gifford for lunch at one o'clock. A total of 106 species made up the composite list for the day.

The most interesting personal feature of the meeting was the attendance of Rev. J. M. Bates, veteran botanist and ornithologist. Mr. Bates was born on January 3, 1846, in Connecticut, and died on May 25, 1930, only a few days after his appearance on the program at Omaha, at the age of 84. His work on plant rusts and in the field of ornithology was recognized in those respective sciences.

TO OUR CONTRIBUTORS

Our members are urged to submit articles for publication in the BULLETIN Short items are desired for the department of General Notes, as well as longer contributions, especially pertaining to life-history, migration, ecology, behavior, song, economic ornithology, field equipment and methods, etc. Local faunal lists are also desired, but they should be annotated, at least briefly, and should be based upon sufficient study to be reasonably complete. Authors are asked to include the common name, the scientific name (from the A. O. U. check-list), and annotations, and they should be arranged in this order. The annotations should include explicit data concerning unusual species. Omit serial numbering.

THE MANUSCRIPT. The manuscript, or copy, should be prepared with due regard for literary style, correct spelling and punctuation. Use sheets of paper of good quality and of letter size (8½x11 inches); write on one side only, and leave wide margins; if at all possible manuscript should be prepared with a typewriter, using double spacing and a reasonably fresh, black ribbon.

The title should be carefully constructed so as to indicate most clearly the nature of the subject matter of the contribution. Where the paper deals with a single species it is desirable to include in the title both the common and the scientific names, or, to include the scientific name in the introductory paragraph. Contributors are requested to mark at the top of the first page of the manuscript the number of words contained. This will save the editor's time and will be appreciated.

Manuscripts intended for publication in any particular issue should be in the hands of the editor sixty to ninety days prior to the date of publication.

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